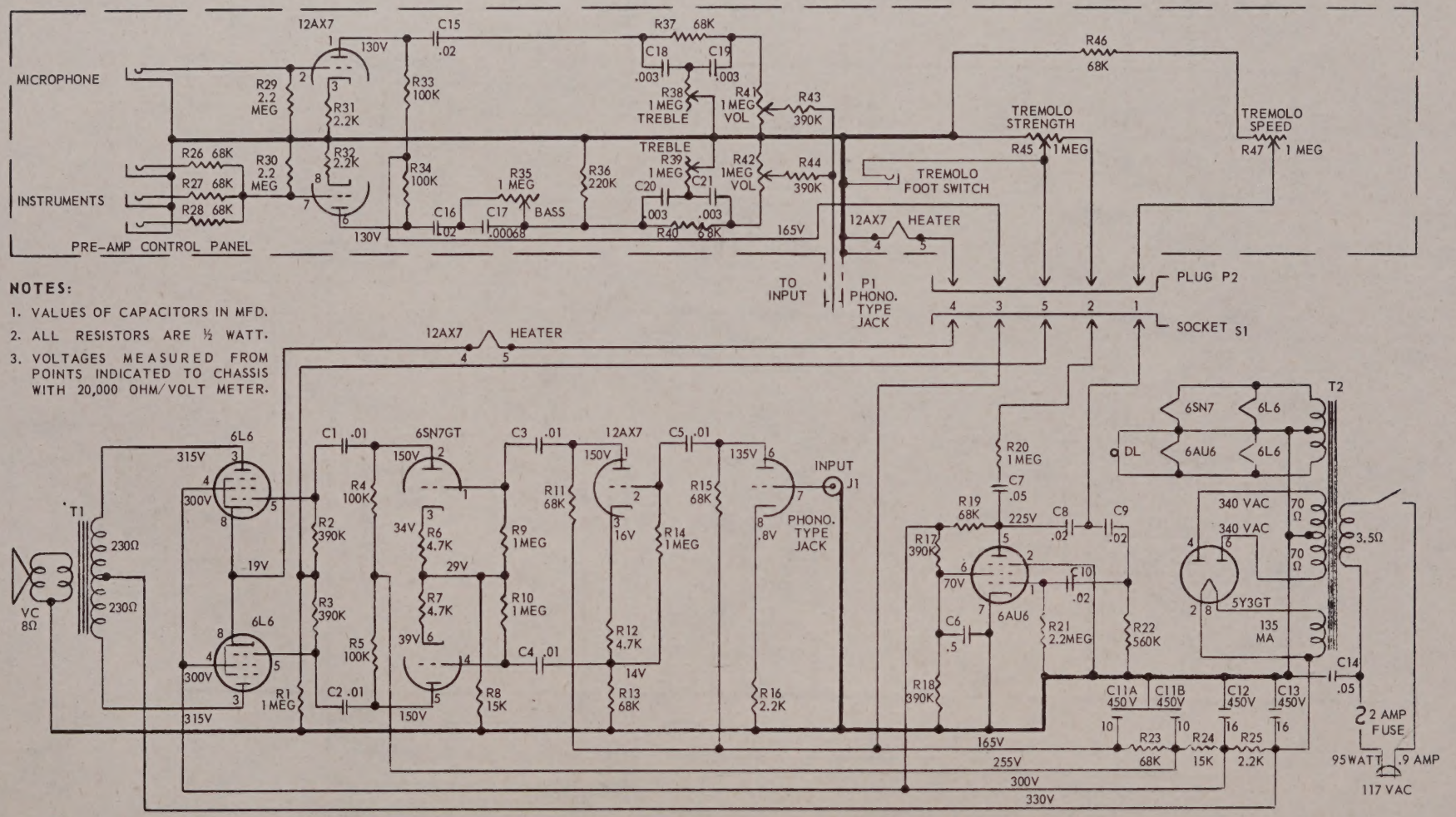
The PHOTOFACT Servicer

SET 414 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ SEPT. 15, 1958

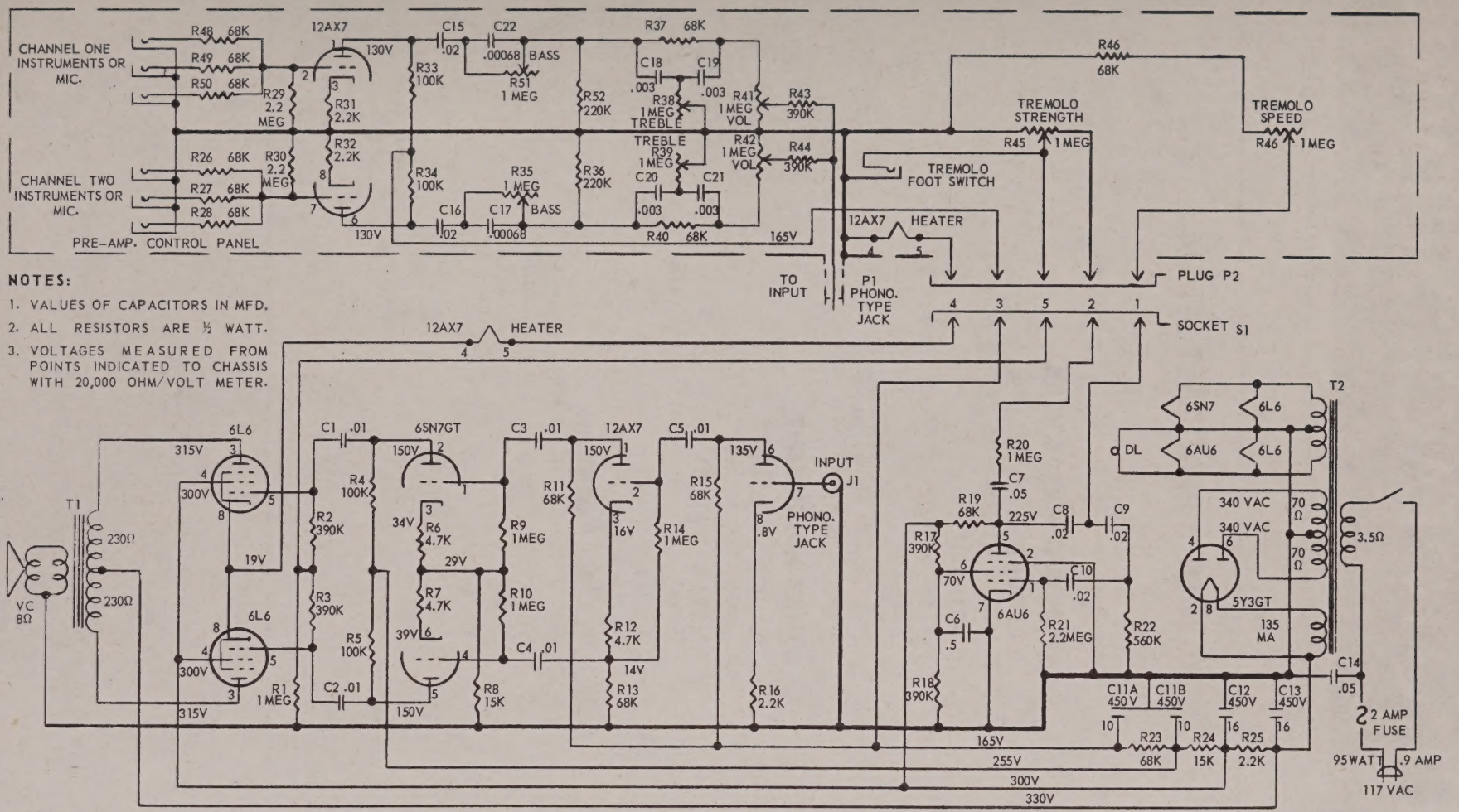
CONTENTS PHOTOFACT SET 414

TRADE NAME AND MODEL	SET AND FOLDER NO.
TELEVISION RECEIVERS	
DUMONT	
Chassis RA-406, RA-407	414-1
HOTPOINT	
14S208, 14S209 & UHF (Q3 Line)	414-2
TRAV-LER	
17MT65, 721-K-610, 721-LP-650, 721-MT-600, 1722, 1723, U, 1724 (Ch. 740-78, 743-48, 775-88)	414-3
OTHER EQUIPMENT	
GENERAL ELECTRIC	
P725B, P726B, P750A	414-4
HARMAN-KARDON	
TA-12	414-5
MOPAR	
922 (85BC)	414-6
PENTRON Tape Recorder	
NL-1, -1S, NL-2, -2S, NL-3, -3S, TM-1, -4	414-7
TOWER Tape Recorder	
4691	414-8
TRUETONE	
D3716B	414-9
V-M	
557, 562, 566, 568	414-10



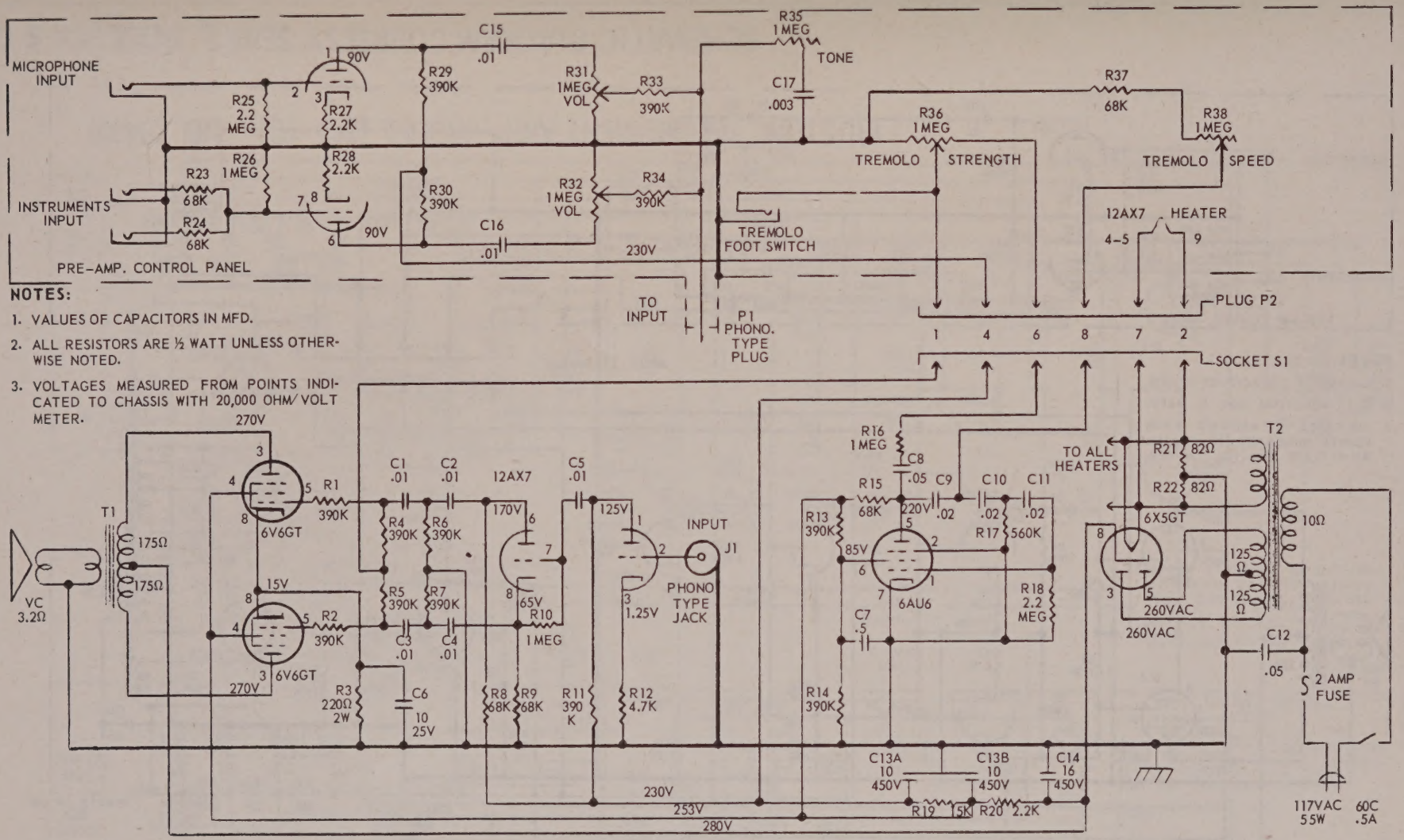
MUSICAL INSTRUMENT AMP. MODEL 1393, 1394 (Ch. 185.10300)

SCHEMATIC DIAGRAM COURTESY SEARS, ROEBUCK & CO.



MUSICAL INSTRUMENT AMP. MODEL 1395 (Ch. 185.10400)

SCHEMATIC DIAGRAM COURTESY SEARS, ROEBUCK & CO.



MUSICAL INSTRUMENT AMP. MODEL 1392 (Ch. 185.10200)

SCHEMATIC DIAGRAM COURTESY SEARS, ROEBUCK & CO.

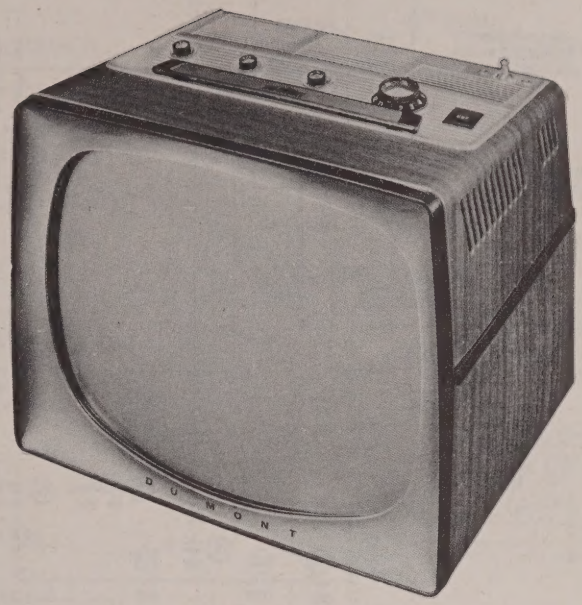
PHOTOFACT* Folder
*TRADE MARK
EIA ELECTRONIC INDUSTRIES ASSOCIATION MEMBER

DUMONT CHASSIS
RA-406, RA-407

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type knobs from the top.
2. Remove 5 metal screws holding the rear cover. Remove the rear cover.
3. Remove 2 metal screws holding the front. Pull front out at bottom and lift up. Remove safety glass.
4. Remove 2 metal screws holding the antenna terminal board.
5. Remove the 2 trim strips from the sides.
6. Remove 8 metal screws holding the top of the cabinet. Remove the speaker leads and the top.
7. Remove 2 hex nuts and 1 bolt holding resistor terminal board.
8. Remove 2 metal screws holding the AC interlock.
9. Remove the picture tube socket, yoke plug and HV lead.
10. Remove 2 side chassis bolts and 2 bottom chassis bolts.
11. Remove the chassis.



CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

TRADE NAME	Dumont Model Sportsman 17 (Chassis RA-406, RA-407)
MANUFACTURER	Allen B. Dumont Laboratories, Inc., 257 Sixteenth Avenue, Paterson, N.J.
TYPE SET	Television Receiver
TUBES	Seventeen
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 170 Watts, 1.65 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF Oscillator is possible by removing the rear cover, and supply power to the receiver. Set the Fine Tuning at the center of its range. The adjustments are accessible, one at a time, thru a hole in the right side of the tuner rear cover as viewed from the rear. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 2 metal screws from the bottom edge of the front. Pull front out at the bottom and lift up to remove.

SPECIAL ADJUSTMENTS

A. Focus
No provision is made to vary the focus on this receiver.

B. Range
Observe the picture and advance the Range Control to a point where the picture distorts or a buzz is heard in the sound. Back off from this setting until the picture becomes stable with no noise in the sound.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

For adjustment of the Horizontal Oscillator, it is necessary to remove the rear cover and supply power to set. Set the Horizontal Hold at the center of its range and adjust the Horizontal Frequency slug (B1) until the picture synchronizes horizontally. (For location, see tube placement chart.)

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the buzz control for MINIMUM buzz and maximum sound. (For location, see tube placement chart.)

FUSE DEVICE

A Circuit Breaker is used for LV power supply protection, and may be reset by depressing the reset button. (For location, see tube placement chart.)

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

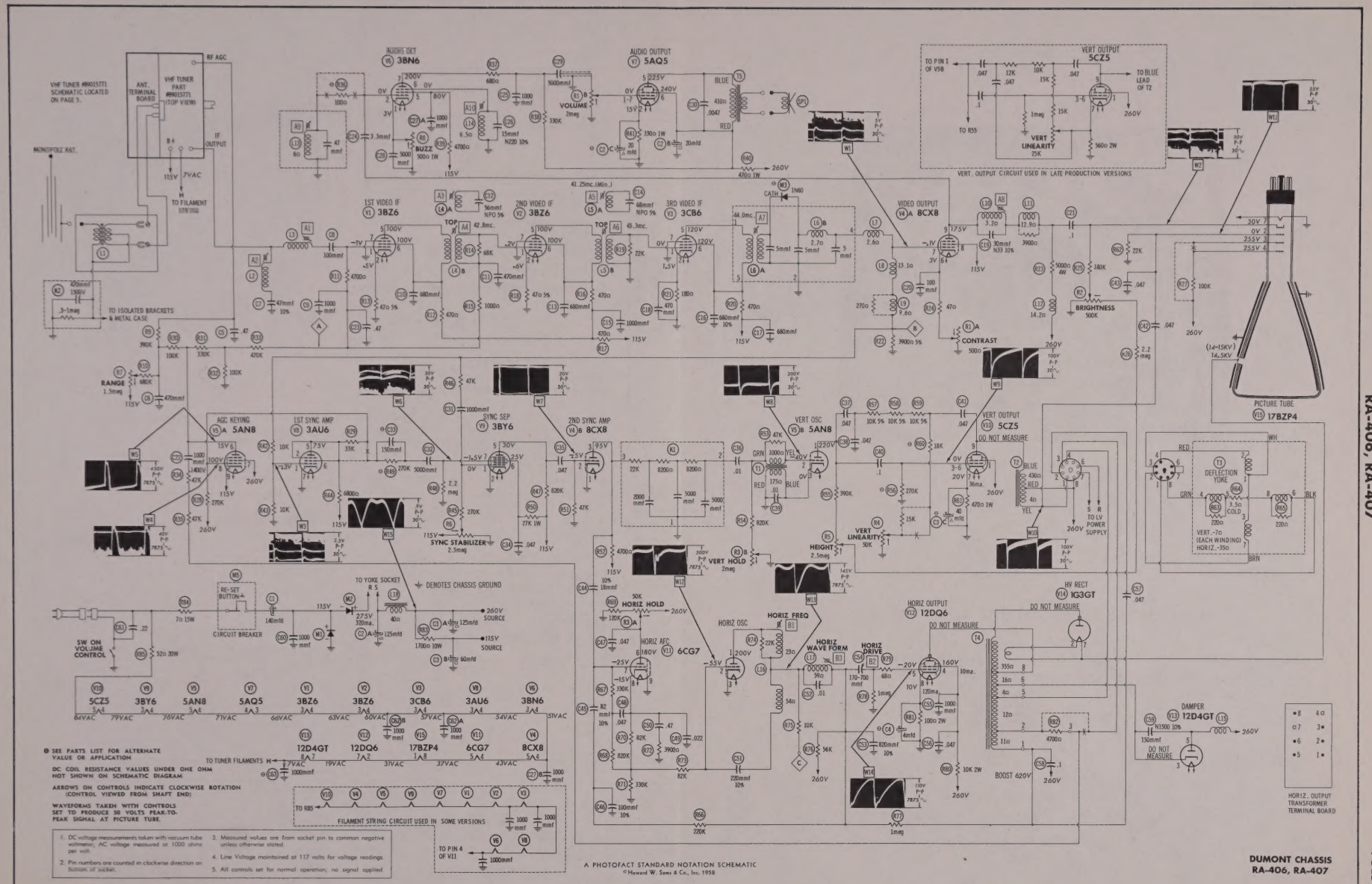
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

H715

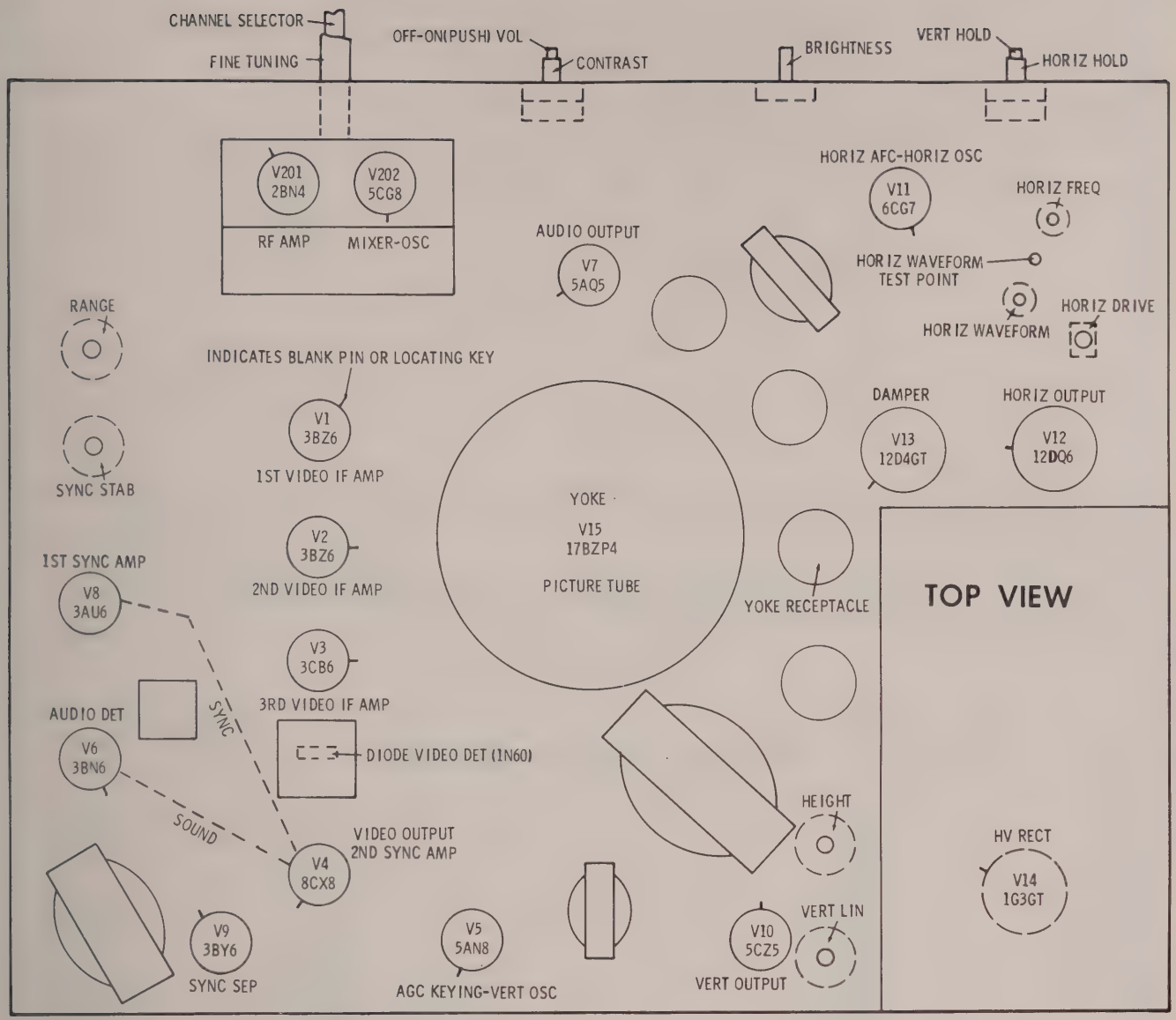
DUMONT CHASSIS
RA-406, RA-407

DUMONT CHASSIS
RA-406, RA-407

SET 414 FOLDER 1


DUMONT CHASSIS
RA-406, RA-407
FOLDER 1
VHF TUNER ##9015771 SCHEMATIC LOCATED ON PAGE 5.
ANT. TERMINAL BOARD
VHF TUNER PART ##9015771 (TOP VIEW)
RF AGC
IF OUTPUT
B+
115V
7VAC
TO FILAMENT
MONOPOLE ANT.
AUDIO DET V6 3BN6
AUDIO OUTPUT V7 5AQ5
VOLUME 2meg
BUZZ 500Ω 1W
1ST VIDEO IF V1 3BZ6
2ND VIDEO IF V2 3BZ6
3RD VIDEO IF V3 3CB6
41.25mc.(Min.)
42.8mc.
45.3mc.
66.0mc.
1N60
VIDEO OUTPUT V4A 8CX8
VERT OUTPUT 5CZ5
TO PIN 1 OF V5B
TO R55
TO BLUE LEAD OF T2
VERT LINEARITY 25K
VERT. OUTPUT CIRCUIT USED IN LATE PRODUCTION VERSIONS
CONTRAST 500Ω
BRIGHTNESS 500K
PICTURE TUBE V15 17BZP4
(14-15KV)
TO ISOLATED BRACKETS & METAL CASE
RANGE 1.5meg
AGC KEYING V5A 5AN8
1ST SYNC AMP V5B 3AU6
SYNC SEP V3 3BY6
2ND SYNC AMP V4B 8CX8
SYNC STABILIZER 2.5meg
VERT OSC V5B 5AN8
VERT OUTPUT V9 5CZ5
DO NOT MEASURE
VERT LINEARITY 50K
HEIGHT 2.5meg
VERT HOLD 2meg
DEFLECTION YOKE T3
VERT.-7Ω (EACH WINDING)
HORIZ.-35Ω
RED
WH
GRN
BLK
BRN
BLUE
YEL
S R TO LV POWER SUPPLY
RE-SET BUTTON
CIRCUIT BREAKER
SW ON VOLUME CONTROL
TO YOKE SOCKET R S
DENOTES CHASSIS GROUND
275V 320ma.
115V SOURCE
260V SOURCE
HORIZ HOLD 50K
HORIZ AFC V11 6CG7
HORIZ OSC
HORIZ FREQ
HORIZ WAVE FORM
HORIZ DRIVE
HORIZ OUTPUT V12 12DQ6
HV RECT V14 1G3GT
DAMPER V13 12D4GT
BOOST 620V
HORIZ. OUTPUT TRANSFORMER TERMINAL BOARD
5CZ5 5AT4 84VAC
3BY6 3AT4 79VAC
5AN8 5AT4 76VAC
5AQ5 4A3 71VAC
3BZ6 3AT4 66VAC
3BZ6 3AT4 63VAC
3CB6 3AT4 60VAC
3AU6 3AT4 57VAC
3BN6 3AT4 54VAC
12D4GT 8A7 51VAC
12DQ6 7A2 19VAC
17BZP4 1A8 31VAC
6CG7 5A4 37VAC
8CX8 5A4 43VAC
TO TUNER FILAMENTS
FILAMENT STRING CIRCUIT USED IN SOME VERSIONS
TO R85
TO PIN 4 OF V11
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
©Howard W. Sams & Co., Inc. 1958
DUMONT CHASSIS
RA-406, RA-407

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

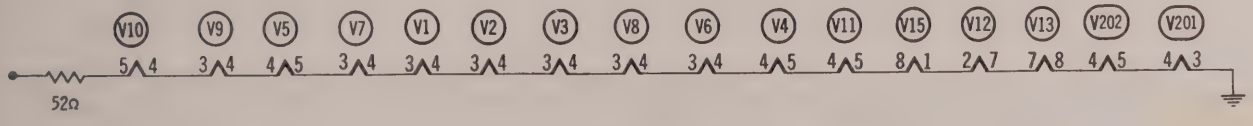
POWER SUPPLY FAILURE
No raster, no sound Circuit Breaker (M5), Rectifiers (M1, M2)

SWEEP FAILURE
No raster, has sound V11, V12, V13, V14, V15
No vertical deflection V5, V10
Poor vert. linearity or foldover V5, V10
Poor horiz. linearity or foldover V11, V12, V13
Narrow picture V11, V12, V13, M1, M2
Vert. off freq. V5
Horiz. off freq. V11

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (M3), V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V15
Has pic, no sound V6, V7
Overloaded picture V5

SYNC FAILURE
No vert. sync V8, V9, V4
No horiz. sync V8, V9, V4, V11
No vert. or horiz. sync V8, V9, V4

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



DUMONT CHASSIS RA-406, RA-407

FOLDER 1

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to point (A) . Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over Mixer-Osc. tube (V202). Low side to chassis.	43.5MC (15MC Swp)	41.25MC 45.75MC 47.25MC	Any non-interfering channel	Vert. Amp. thru detector probe (Fig.1) to pin 5 (plate) of 1st. Video IF Amp. (V1). Low side to chassis.	A1, A2, A3, & Mixer Plate Coil	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown. A1 and Mixer Plate Coil control shape of curve top and position of 45.75MC marker. Adjust A2 to position 41.25MC marker and A3 to position 47.25MC marker.
2.	"	"	Not used	42.8MC (Unmod)	"	USE VTVM. DC probe to point (B). Common to chassis (Across Video Det. Load)	A4	Adjust for maximum gain.
3.	"	"	"	41.25MC	"	"	A5	Adjust for MINIMUM deflection.
4.	"	"	"	45.3MC	"	"	A6	Adjust for maximum deflection.
5.	"	"	"	44.0MC	"	"	A7	"

4.5MC TRAP ALIGNMENT

Restore receiver to normal operation and tune in a TV station. Adjust Fine Tuning until a beat pattern is noted in the picture. Adjust A8 until the horizontal scanning lines are smooth and continuous.

SOUND IF ALIGNMENT

Tune in a TV signal and adjust controls for normal operation. Reduce the signal strength by connecting an adjustable attenuator in series with the antenna lead . Attenuate signal until a hiss is heard in the sound similar to super-regeneration. Adjust A9, A10 and the Buzz Control (R8) for maximum undistorted sound with MINIMUM buzz.

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGE 12.

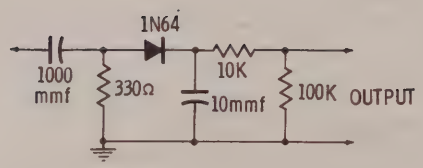


FIG.1

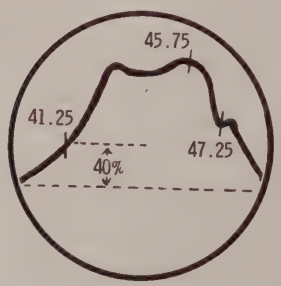
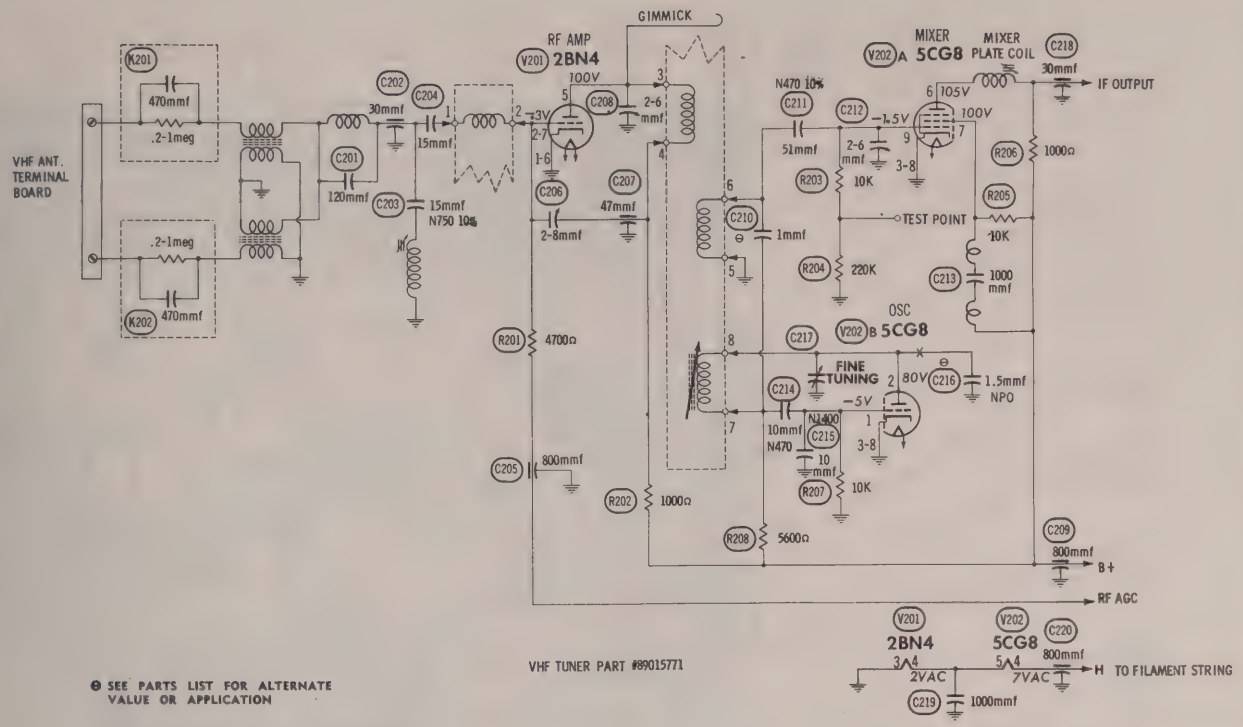


FIG. 2



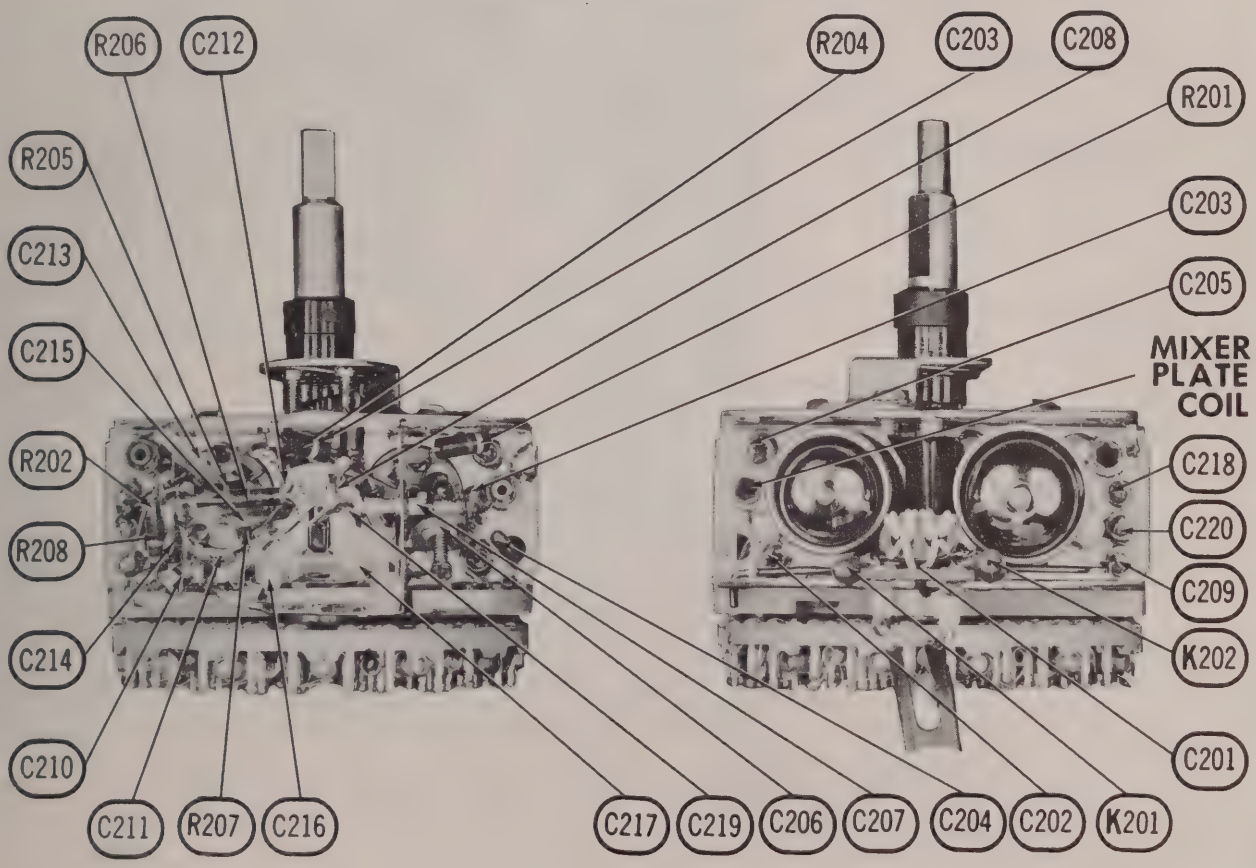
VHF TUNER PART #89015771

❸ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

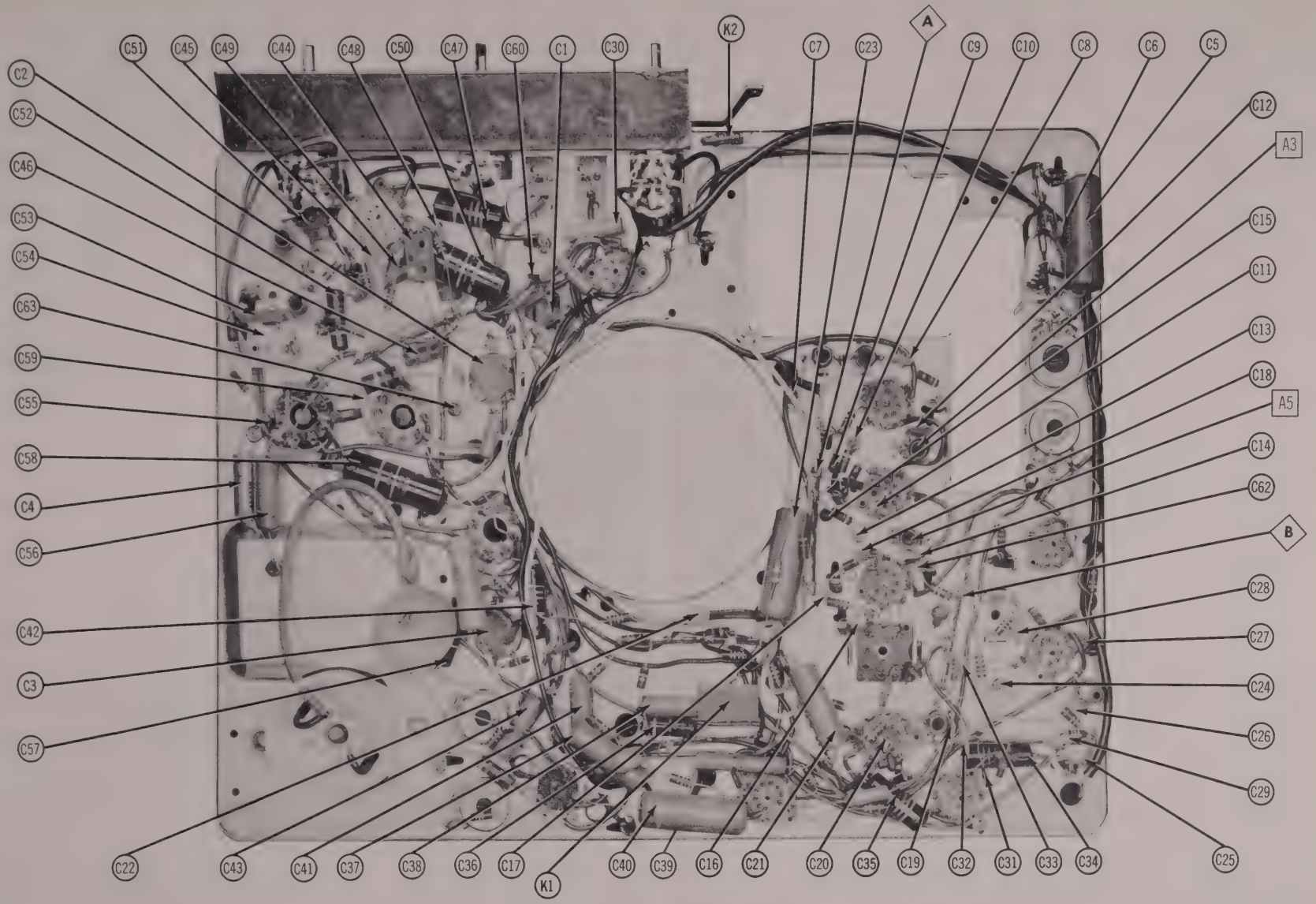
A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1958

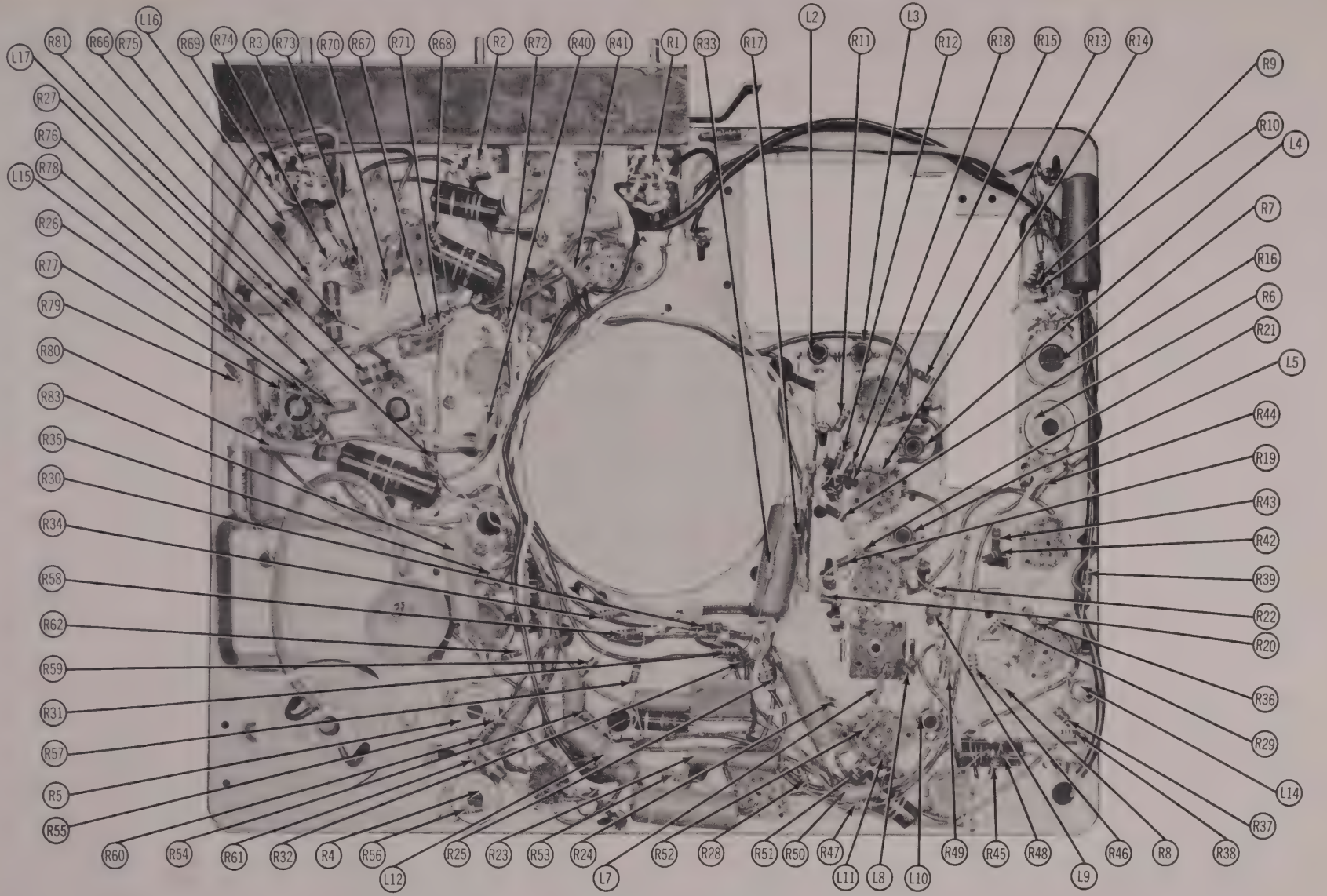
VHF TUNER #89015771



RF TUNER



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	1st. Video IF Amp.	3BZ6	
V2	2nd. Video IF Amp.	3BZ6	
V3	3rd. Video IF Amp.	3CB6	
V4	Video Output-2nd. Sync Amp	6CX8	
V5	AGC Keying-Vert. Osc.	5AN8	
V6	Audio Det.	3BN6	
V7	Audio Output	5AQ8	

ITEM No.	USE	TYPE	NOTES
V8	1st. Sync Amp.	3AU6	
V9	Sync Sep.	3BY6	
V10	Vert. Output	5CZ5	
V11	Horiz. AFC-Horiz. Osc.	6CG7	
V12	Horiz. Output	12DQ6	
V13	Damper	12DG7	
V14	HV Rectifier	1G3GT	

PICTURE TUBE

ITEM No.	REPLACEMENT DATA: DUMONT PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	SYLVANIA PART No.	NOTES
V15	17BZP4		17BZP4 ①	17BZP4 ②	① "Silverama" ® ② "Silver Screen 86"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: DUMONT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	140	150	3319134①	AFH51-33	XA0351	FP117	TMH-34	T-055	TVL-1428
C2A	125	300	3319139①	AFH4-02-60	XC0733. 2	FP218		Q-232. 2	R2376 *
B	20	300				TT50X20		MT-0520	
C	20	50	①						
C3A	125	300	3319140①	AFH3-99-82	XC0733. 7	FP330. 27	TMT-36	T-115	TVL-3574. 6
B	60	300						MT-0550	
C	40	50	①						
C4	4	50	②	PRS150V4	BBR4-50	TT50X5	TD-4-50	MT-0504	TE-1302. 1

① In some versions C2C and C3C may be interchanged, or C3C may be omitted.
② Some versions may use a 5mfd @ 50VDC in this application (Part #3319149)
* Non-catalog item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: DUMONT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	.47	200		P2S8N-47		CUB2P47	GEM-2047	2TM-P47	
C6	470			BPD-0047	DD-471	L10T47	UC-5347	5GA-T47	
C7	47			NPO-SI 47	DS-470	L20Q47		5TCC-4J47	10%
C8	100			SI 100	DS-101	L20T1	UC-531	5GA-T1	
C9	1000			BPD-001	DD-102	BYA5D1	DC521	5HK-D1	
C10	680			BPD-0068	DD-681	L10T68	UC-5368	5GA-T68	
C11	470			BPD-0047	DD-471	L10T47	UC-5347	5GA-T47	
C12	56								
C13	680			BPD-0068	DD-681	L10T68	UC-5368	5GA-T68	NPO 5%
C14	68				DTZ-68				NPO 5%
C15	1000			BPD-001	DD-102	BYA5D1	DC521	5HK-D1	
C16	680				MD-681				10%
C17	680			BPD-0068	DD-681	L10T68	UC-5368	5GA-T68	
C18	470			BPD-0047	DD-471	L10T47	UC-5347	5GA-T47	
C19	30								N33 10%
C20	100			SI 100	DS-101	L10T1	UC-531	5GA-T1	
C21	.1	400		P4S8N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C22	1000	1600		SVD25-1000	DC50-102	SVB16D1	DC302I	30GA-D1	
C23	.47	200		P2S8N-47	DF-503	CUB2P47	GEM-3047	2TM-P47	
C24	3.3			NPO-SI 3.3	TCS-3S3	CTA5V33C	ET-5333	5TCCB-V33	
C25	1000								10%
C27A	18								N330 10%
B	1000			BPD-X2D01	DD2-103	BYD5D1N	DCD521	5HK-D2I	
C28	5000			BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C29	5000			BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C30	0047	400		P4S8N-0047	DS-472	CUB5D47	GEM-5347	5TM-D47	
C31	1000			BPD-001	DD-103	BYA5D1	DC521	5HK-D1	
C32	5000			BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C33	150			BPD-0015	DD-151	L10T15	UC-5315	5GA-T15	①
C34	.047	400		P4S8N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C35	.047	400		P4S8N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C36	.01	400		P4S8N-01	DS-103	CUB4S1	GEM-411	4TM-S1	
C37	.047	600		P6S8N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	
C38	.047	200		P2S8N-047	DF-503	CUB2S47	GEM-2147	2TM-S47	
C39	.01	400		P4S8N-01	DS-103	CUB4S1	GEM-411	4TM-S1	
C40	.1	600		P6S8N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C41	.047	400		P4S8N-047	DF-503	CUB4S47	GEM-6147	4TM-S47	
C43	.047	400		P4S8N-047	DF-503	CUB4S47	GEM-6147	4TM-S47	
C43	.047	200		P2S8N-047	DF-503	CUB2S47	GEM-6147	2TM-S47	
C44	15			1469-000015	DD-150	22R5Q15		MS-415	10%
C45	82			1469-000082	DD-820	22R5Q82		MS-482	10%
C48	100			1469-0001	DD-101	22R5T1	MCB235	MS-31	10%
C47	.047	400		P4S8N-047	DF-503	CUB4S47	GEM-6147	4TM-S47	
C48	.047	200		P2S8N-047	DF-503	CUB2S47	GEM-6147	2TM-S47	
C49	.022	200		P2S8N-022	DD-303	CUB4S22	GEM-6122	2TM-S22	
C50	.47	200		P2S8N-47		CUB3P47	GEM-3047	2TM-P47	
C51	220			1469-00022	MD-221	22R5T22		MS-322	10%
C52	.01	400		P4S8N-01	DS-103	CUB4S1	GEM-411	4TM-S1	
C53	820			1469-00082		1R5T82		MS-381	10%
C54	170		3318411						
	700								
C55	1000			BPD-001	DD-103	BYA5D1	DC521	5HK-D1	
C56	.047	400		P4S8N-047	DF-503	CUB4S47	GEM-6147	4TM-S47	
C57	.047	600		P6S8N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	
C58	.1	600		P6S8N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C59	150	5000							N1500 10%
C60	1000			BPD-001	DD-102	BYA5D1	DC521	5HK-D1	
C61	.22	400		P4S8N-23		CUB4P22	GEM-4022	4TM-P22	
C62A	1000			BPD-X2D01	DD2-103	BYD5D1N	DCD521	5HK-D2I	
B	1000								
C63	1000			BPD-001	DD-103	BYA5D1	DC521	5HK-D1	②

① Some versions may use 330mmf in this application as part of a component combination.
② Not used in some versions.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: DUMONT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No	INSTALLATION NOTES
R1A	500Ω	½	0107J001				UR1338	Contrast
B	2meg	½					Not Req.	Volume
C	Switch						Not Req.	Push-Push
R2A	500K	½	0107J101	AB-59	A47-500K-Z	QU-133	U80	Brightness
B	Shaft			AK-19	R6-3/16	NQ	D8-37	
R3A	50K	½	0107J101	F1-39			●UR3686	Horiz. Hold
B	2meg	½		R2-47			Not Req.	Vert. Hold
R4A	50K	½	0107J001	AB-31	B47-50K-S	QU-133	PTA54L	Vert. Lin.
B	Shaft			AK-19	Not Req.	TQ	Not Req.	
R5A	2.5meg	½	0107J111	AB-83	B47-2.5meg-S	QU-339	SU-565	Height
B	Shaft			AK-19	Not Req.	TQ	Not Req.	
R6A	2.5meg	½	0107J111	AB-83	B47-2.5meg-S	QU-339	SU-565	Sync Stab
B	Shaft			AK-19	Not Req.	TQ	Not Req.	
R7A	1.5meg	½	0107J121	AB-742	B47-1.5meg-S	QU-138	PTA1254L	Range
B	Shaft			AK-19	Not Req.	TQ	Not Req.	
R8	500Ω	1(WW)	0107J061		39-500		FL-600	Buzz

● "STA-LOC" Equivalent : FA54L, OF1000, RU26L, SI625.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING: OHMS	RATING: WATT	DUMONT PART No.	NOTES
R9	390K			
R10	680K			Note 2
R11	4700Ω			
R12	470Ω			
R13	47Ω 5%			
R14	68K			
R15	1000Ω			
R16	4700			
R17	4700			Note 3
R18	47Ω 5%			
R19	22K			
R20	470Ω			
R21	180Ω			Note 4
R22	3900Ω 5%			
R23	5000Ω	4	0239050I	
R24	47Ω			
R25	180K			
R26	2.2meg			
R27	100K			
R28	270K			
R29	33K			
R30	100K			
R31	330K			
R32	100K			
R33	470K			
R34	47K			Note 1
R35	47K			
R36	100Ω			
R37	680Ω			
R38	330K			
R39	4700Ω			
R40	470Ω	1		
R41	330Ω	1		
R42	10K			
R43	10K			
R44	680Ω			
R45	270K			
R46	47K			
R47	820K			

ITEM No.	RATING: OHMS	RATING: WATT	DUMONT PART No.	NOTES
R48	2.2meg			
R49	270K			Note 2
R50	27K	1		
R51	47K			
R52	4700Ω			
R53	47K			
R54	820K			
R55	390K			
R56	270K			Note 3
R57	10K 5%			
R58	10K 5%			
R59	10K 5%			
R60	18K			Note 4
R61	470Ω	1		
R62	22K			
R63	220Ω			
R64	3 5Ω Cold			
R65	220Ω			
R66	220K			
R67	330K			
R68	820K			
R69	120K			
R70	82K			
R71	330K			
R72	3900Ω			
R73	82K			
R74	22K			
R75	10K			
R76	56K			
R77	1meg			
R78	1meg			
R79	68Ω			
R80	10K	2		
R81	100Ω	2		
R82	4700Ω			
R83	1700Ω	10	0224082O	
R84	7Ω	15	0239051I	
R85	5Ω	30	0239052I	

Note 1. Not used in some versions.
Note 2. Some versions may use 150K in this as part of a component combination.
Note 3. Some versions may use 470K in this application.
Note 4. Some versions may use 15K in this application.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: DUMONT PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Ant. Trans.	30013921					
L2	39MC Coil	2101B511		TV-152	4206		
L3	1st. Video IF	2101B521	17-4534	TV-131		VF-4	
L4A	47.25MC Trap	30013891	17-4536		6222		
B	2nd. Video IF						
L5A	41.25MC Trap	30013901	17-4535		6221		
B	3rd. Video IF						
L6A	4th. Video IF	30013911	17-4514 *				Includes M3, and Caps.
B	Resonant Choke						
L7	Resonant Choke	2101B631					
L8	Shunt Peaking Coil	2101B541	19-3160	TV-196	6120	VP-5	160 Microhenries
L9	Shunt Peaking Coil	2101B551	19-3100	TV-194	6112	VP-3	100 Microhenries
L10	4.5MC Trap	2101B561	20-1004	TV-151	1469 †	SF-3	
L11	Series Peaking Coil	2101B571	19-3160	TV-196	6120		150 Microhenries
L12	Shunt Peaking Coil	2101B581	19-4301	TV-194	6180	VP-5	190 Microhenries
L13	Sound IF	2101B491		TV-154			
L14	Quadrature Coil	2101B501	20-1005	TV-121	1480		
L15	RF Choke	2101B621		SW-631	4509		5 Microhenries

* Enlarge mounting holes. † Disregard tap.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: DUMONT PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	NOTES
L16	77Ω *		2101B601		TV-166	6212		HS-7	Horiz. Freq.
L17	59Ω		2101B611						* Tapped @ 54Ω Horiz. Waveform

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	RATINGS: DC RES.	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: DUMONT PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No	Triad PART No
L18	.320A	40Ω	1 Hy.	2101B591					26C44 ①	

① Drill new mounting hole.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: DUMONT PART No	Halldorson PART No	Merit PART No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No	NOTES
T1	Vert. Osc.	2101T501	B6702	A-3003	V405	A-8125	26A03	A-97X	
T2	Vert. Output	2101T511							
T3 A	Yoke-Horiz (19MH)	2101T521			Y-110 ①②	DY-27A ①	Y-52 ①		
B	(11Ω)-Vert.(13MH)								
	Rear Cover &								
	Centering Device	42016581							
	Yoke Clamp	3700K03							
T4	Horiz. Output	2101J951							

① Use original rear cover and centering device, horizontal damping network.
② Connect yoke terminal #2 to yoke plug pin #4, yoke terminal #1 and #3 to yoke plug pin #3, yoke terminal #1 to yoke plug pin #2.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: DUMONT PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	6100Ω	3-4Ω	2001J881	Z1110	A-3026	AU-602 ①	A-3877 ①	24S51 ①	S-6X	① Drill new mounting hole.

SPEAKER

ITEM No.	TYPE: SIZE	TYPE: FIELD	TYPE: V. C. IMP.	REPLACEMENT DATA: DUMONT PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	1800417I	4A07	

COMPONENT COMBINATIONS

ITEM No	USE	DESCRIPTION	DUMONT PART No	REPLACEMENT DATA	
K1	Vert. Integrator	2000mmf, 5000mmf, 5000mmf, 8200Ω, 8200Ω, 22k		Aerovox	PA-110
				Centralab	PC-104
				Cornell-Dubilier	115TM1
				Sprague	V-1/V-3
K2	Chassis Isolation	470mmf 1500V ,.3-1meg		Centralab	RC-471
				Sprague	AC1-1

RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: DUMONT PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.320A	2600284I ①		1N100T ②	SD-94 ①	40K ①	① Silicon Type.
M2	.320A	2600284I ①		1N100T ②	SD-94 ①	40K ①	② Germanium Type.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: DUMONT PART No.	CBS PART No.	SYLVANIA PART No.	NOTES
M3	1N60 *		1N60	1N295	Video Detector (Pigtail) * Some versions may use a CK706A in this application.

MISCELLANEOUS

ITEM No.	PART NAME	DUMONT PART No.	NOTES
M4	Tuner	89015771	
M5	Circuit Breaker	05015091	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	45009291	
Mask	64015821	
Knob	45009281	Fine Tuning
Knob	45009271	Channel Selector
Knob	45009281	Brightness
Knob	45009251	Contrast
Knob	45009241	On-Off-Volume
Cabinet	33038281	Top
Cabinet	33038271	Bottom

WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-In	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

DUMONT CHASSIS RA-406, RA-407

FOLDER 1

TUNER PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amp.	2BN4	

ITEM No.	USE	TYPE	NOTES
V202	Mixer-Osc.	5CG8	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: DUMONT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C201	120			BPD-00012	DD-121	L10T12	UC-5312	5GA-T12	
C202	30								
C203	15			N750-DI 15	DTN-15	C10Q15U		5TCU-Q15	N750 10%
C204	15			BPD-000015	DD-150	L10Q15	UC-5415	5GA-Q15	
C205	800								
C206	2-8								
C207	47								
C208	2-6								
C209	800								
C210	1.0			NPO-SI 1.0	TCZ-1			5TCCB-V1	①
C211	51								N470 10%
C212	2-6								
C213	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C214	10								N470
C215	10								N1400
C216	1.5			NPO-SI 1.5	TCZ-1R5	C10V15C	ZT-5515	5TCCB-V15	NPO ②
C217									
C218	30								
C219	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C220	800								

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	DUMONT PART No.	NOTES
R201	4700Ω			
R202	1000Ω			
R203	10K			
R204	220K			

ITEM No.	RATING OHMS	RATING WATT	DUMONT PART No.	NOTES
R205	10K			
R206	1000Ω			
R207	10K			
R208	5600Ω			

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	DUMONT PART No.	REPLACEMENT DATA	
K201	Antenna Isolation	470mmf, .2-1meg		Centralab Sprague	RC-471 R-9197
K202	Antenna Isolation	470mmf, .2-1meg		Centralab Sprague	RC-471 R-9197

TUNER ALIGNMENT INSTRUCTIONS

OSCILLATOR ALIGNMENT

Touch-up adjustment of the VHF Oscillator is possible by removing the rear cover, and supplying power to the receiver. Set the Fine Tuning at the center of its range. The adjustments are accessible, one at a time, thru a hole in the right side of the tuner rear cover as viewed from the rear. Adjust for best picture and sound.

RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

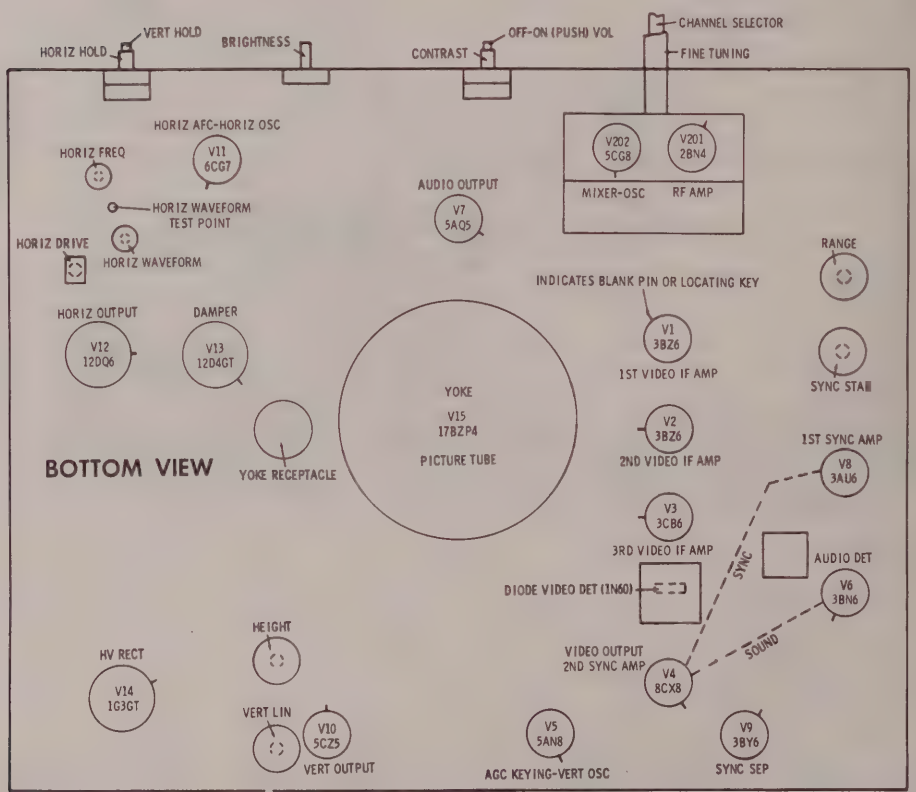
DUMONT CHASSIS
RA-406, RA-407

CHASSIS TOP VIEW

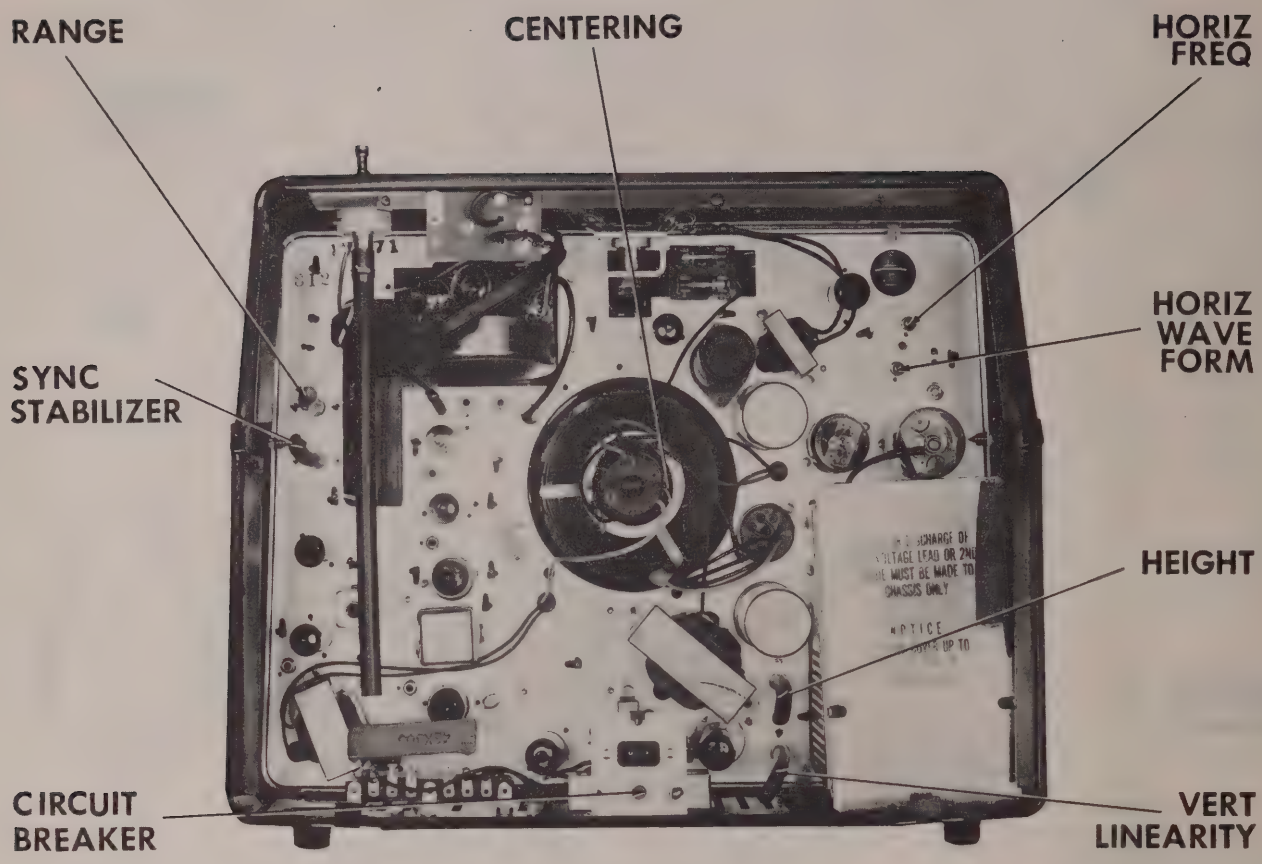
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BZ6	570K	47Ω	17Ω	16Ω	†2600Ω	†2600Ω	0Ω		
V2	3BZ6	570K	47Ω	16Ω	15Ω	†2600Ω	†2600Ω	0Ω		
V3	3CB6	.1Ω	180Ω	15Ω	14Ω	†2100Ω	†2100Ω	0Ω		
V4	8CX8	0Ω	47K	†49K	12Ω	10Ω	• 320Ω	1200Ω	†1700Ω	†5000Ω
V5	5AN8	• ‡1.4meg	1.2meg	175Ω	18.5Ω	20Ω	300K	†0Ω	†35K	†1700Ω
V6	3BN6	• 330Ω	106Ω	13Ω	12Ω	†6400Ω	6.5Ω	†330K		
V7	5AQ5	0Ω	330Ω	17Ω	18.5Ω	†880Ω	†470Ω	0Ω		
V8	3AU6	5000Ω	†8500Ω	14Ω	13Ω	†8500Ω	†8500Ω	0Ω		
V9	3BY6	• 750K	0Ω	21.5Ω	20Ω	†820K	†29K	2.2meg		
V10	5CZ5	†0Ω	NC	270K	21.5Ω	22.5Ω	270K	470Ω	NC	†430Ω
V11	6CG7	†56K	410K	0Ω	10Ω	8.5Ω	• †30K	1.5meg	410K	0Ω
V12	12DQ6	TP	7Ω	TP	†10K	1meg	TP	4.5Ω	100Ω	TOP CAP ‡16Ω
V13	12D4GT	TP	NC	¶800K	NC	†.1Ω	NC	4.5Ω	2Ω	
V14	1G3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ‡371Ω
V15	17BZP4	7Ω	22K	†100K	†100K	NC	NC	• 230K	8.5Ω	
V201	2BN4	0Ω	700K	0Ω	.5Ω	†2700Ω	0Ω	700K		
V202	5CG8	10K	†7300Ω	0Ω	2Ω	.5Ω	†2700Ω	†11K	0Ω	230K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 260V SOURCE. NC NO CONNECTION.
‡ MEASURED FROM PIN 3 OF V13. TP TIE POINT.



TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the Horizontal Hold fully clockwise. Tune in a station and adjust the Horizontal Frequency (B1) until the picture is just about to tear out of sync (jitter at the top of the picture).

Turn the Contrast fully counterclockwise and the Brightness clockwise so that the picture appears washed out. Turn the Horizontal Drive (B2) clockwise until white vertical bars (drive lines) appears in the left center portion of the raster, then counterclockwise until the white bars just disappear.

Connect the vertical amplifier of a scope to point Ⓒ . Low side to chassis. Adjust the Horizontal Waveform (B3) until the round and sharp peaks are equal in amplitude. (See Fig. 3). Keep the picture in sync during this adjustment.

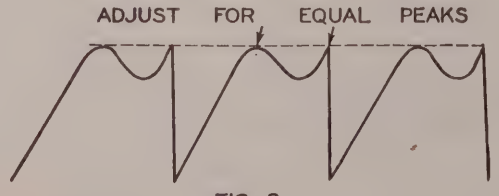


FIG. 3

SET 414 FOLDER 2

HOTPOINT MODELS 14S208, 14S209 & UHF (Q3 Line)

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 6 push-on type knobs from the top.

2. Remove 2 metal screws holding the rear cover. Remove the rear cover.

3. Remove 2 screws holding the top of the chassis, 3 from the bottom.

4. Remove the Picture Tube socket, Ion Trap, Yoke Clamp. Partially remove the chassis and remove the HV lead and speaker leads. Remove the chassis.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

TRADE NAME	Hotpoint MODELS 14S208, 14S209 & UHF (Q3 Line)
MANUFACTURER	Hotpoint Co., 5600 W. Taylor St., Chicago 44, Illinois
TYPE SET	Television Receiver
TUBES	Fourteen
POWER SUPPLY	110-125 Volts AC, 60 Cycle RATING 110 Watts, 1.15 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

HOTPOINT MODELS 14S208, 14S209 & UHF (Q3 Line)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF Oscillator is possible by removing the Channel Selector and Fine Tuning knobs. Set the Fine Tuning at the center of its range. One slug for HIGH band adjustment is located at 1 o'clock, and should be adjusted first. The LOW band adjustment is located at 7 o'clock. Adjust for best picture and sound. NOTE: Chassis may have to be removed for high band adjustment.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 4 metal screws holding the front. Pull front out at the bottom to remove.

FOCUS

Focus may be varied by moving the lead of pin 4 of the picture tube to either side of the Horizontal Hold Control or to a Boost B terminal to the right of the control. Adjust the Ion Trap for maximum brightness consistent with good focus.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

For adjustment of the Horizontal Oscillator, it is necessary to remove the rear cover and supply power to set. Set the Horizontal Hold at the center of its range and adjust the Horizontal Frequency slug (B1) until the picture synchronizes horizontally. (For location, see tube placement chart.)

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the AM Reject Control for MINIMUM buzz and maximum sound. (For location, see tube placement chart.)

FUSES

One fuse is used for low voltage supply protection. (For location, see tube placement chart.)

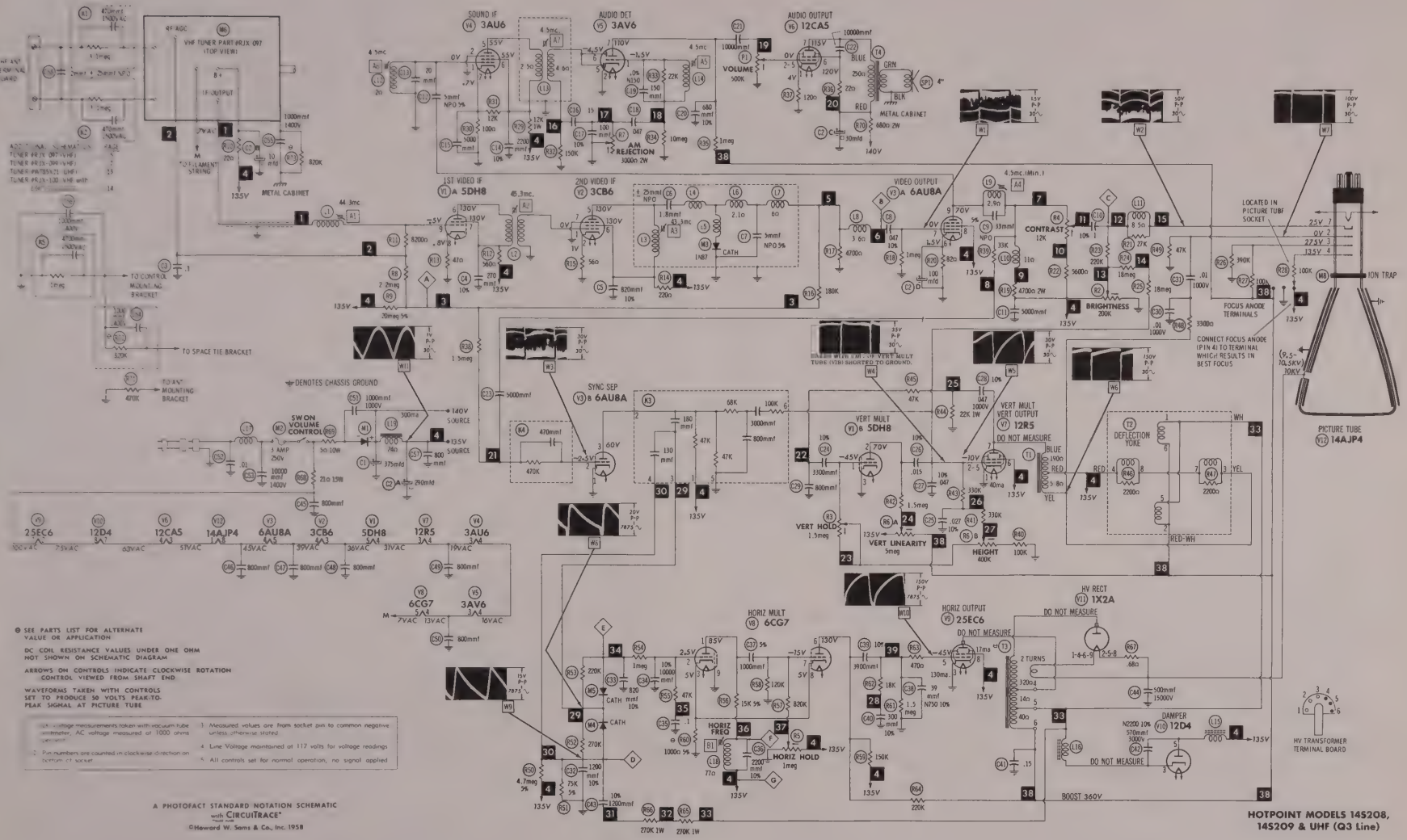
CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

SET 414 FOLDER 2

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of H580R the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America



HOTPOINT MODELS 14S208, 14S209 & UHF (Q3 Line)

© SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION CONTROL VIEWED FROM SHAFT END

WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE

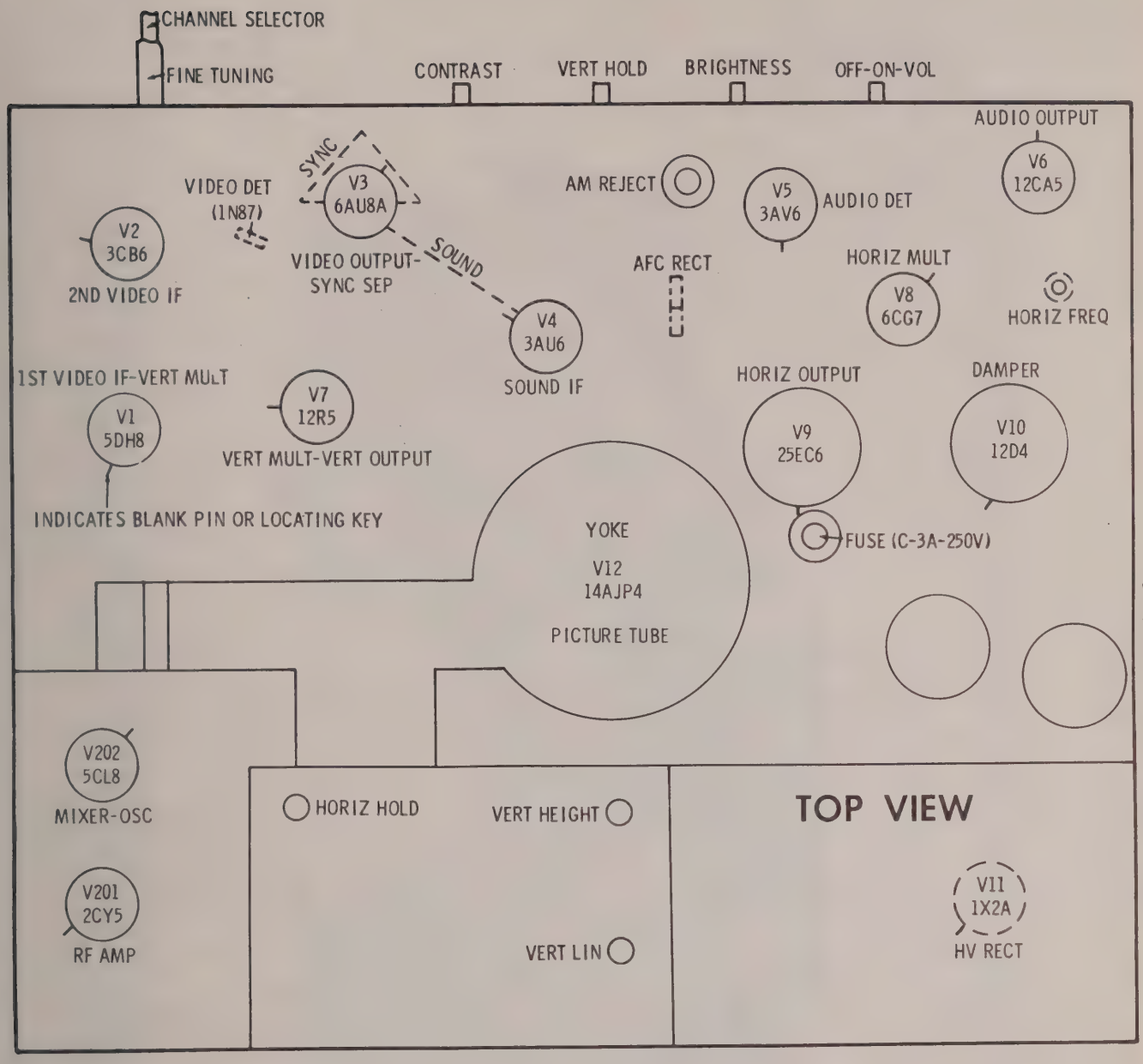
1. DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings
5. All controls set for normal operation, no signal applied

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

©Howard W. Sams & Co., Inc. 1958

HOTPOINT MODELS 14S208, 14S209 & UHF (Q3 Line)

TUBE PLACEMENT CHART



HOTPOINT MODELS 14S208, 14S209 & UHF (Q3 Line)

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

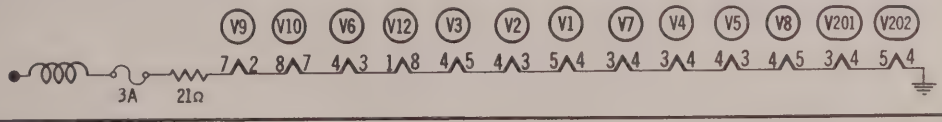
POWER SUPPLY FAILURE
No raster, no sound — Fuse (M2), Rectifier (M1)

SWEEP FAILURE
No raster, has sound — Diode (M4, M5), V8, V9, V10, V11, V12
No vertical deflection — V1, V7
Poor vert. linearity or foldover — V1, V7
Poor horiz. linearity or foldover — V8, V9, V10
Narrow picture — V8, V9, V10, M1
Vert. off freq. — V1, V7
Horiz. off freq. — V8

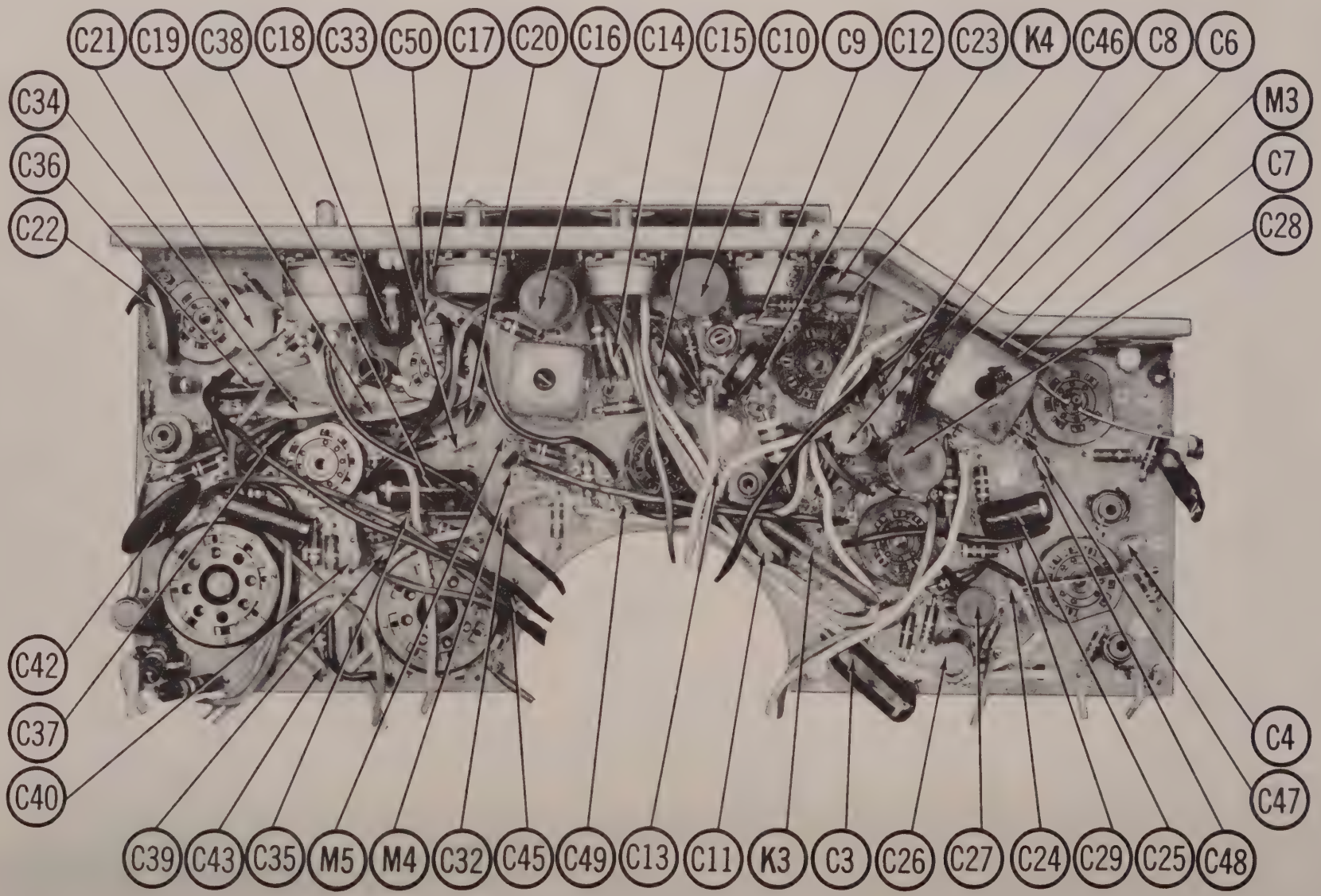
LOSS OF PICTURE OR SOUND
No pic, no sound, has raster — V1, V2, Diode (M3), V3
No pic, no sound, has snow — V201, V202
No pic, has sound, has raster — V3, V12
Has pic, no sound — V4, V5, V6

SYNC FAILURE
No vert. sync — V3
No horiz. sync — V3, M4, M5
No vert. or horiz. sync — V3

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



FOLDER 2



PRINTED BOARD - CAPACITOR IDENTIFICATION

HOTPOINT MODELS 14S208,
14S209 & UHF (Q3 Line)
VHF TUNER #RJX-097
RF AMP 2CY5
MIXER A 5CL8
OSC B 5CL8
V202 5CL8
V201 2CY5
44.3mc. MIXER PLATE COIL
IF OUTPUT
RF AGC
B+
TO FILAMENT STRING
GIMMICK
FINE TUNING
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
TO K1
TO K2
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1958

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS FOR TUNER #RJX-097

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

OSCILLATOR ALIGNMENT

Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Set the Fine Tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 201	Across antenna terminals thru matching network (Fig. 201).	213MC	211.25MC	13	Vert. Amp. thru 47K across Video Det. load.	A201	Adjust to place video marker at 50% as in Fig. 202.
			207MC	205.25MC	12		A202	
			201MC	199.25MC	11		A203	
			195MC	193.25MC	10		A204	
			189MC	187.25MC	9		A205	
			183MC	181.25MC	8		A206	
			177MC	175.25MC	7		A207	
			85MC	83.25MC	6		A208	
			79MC	77.25MC	5		A209	
			69MC	67.25MC	4		A210	
			63MC	61.25MC	3		A211	
			57MC	55.25MC	2		A212	

RF AND MIXER ALIGNMENT

Connect the negative lead of a 3 volt bias supply to point Ⓣ. Positive to chassis.
Disconnect the link from the tuner output leaving the ground wire connected. Connect a 100Ω resistor from the tuner output to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
When making the following adjustments, it may be necessary to change bandwidth. This is accomplished by changing position of the "Gimmick" (A239) with respect to the adjacent capacitor.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Fig. 201	Across antenna terminals thru matching network (Fig. 201).	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point Ⓤ. Low side to chassis.	A213, A214, A215, A216	Adjust in numerical order for maximum gain and symmetry similar to Fig. 203. Adjust first coil for proper frequency and second coil for proper tilt.
3.	"	"	207MC	205.25MC 209.75MC	12	"	A217, A218	"
4.	"	"	201MC	199.25MC 203.75MC	11	"	A219, A220	"
5.	"	"	195MC	193.25MC 197.75MC	10	"	A221, A222	"
6.	"	"	189MC	187.25MC 191.75MC	9	"	A223, A224	"
7.	"	"	183MC	181.25MC 185.75MC	8	"	A225, A226	"
8.	"	"	177MC	175.25MC 179.75MC	7	"	A227, A228	"
9.	"	"	85MC	83.25MC 87.75MC	6	"	A229, A230	"
10.	"	"	79MC	77.25MC 81.75MC	5	"	A231, A232	"
11.	"	"	69MC	67.25MC 71.75MC	4	"	A233, A234	"
12.	"	"	63MC	61.25MC 65.75MC	3	"	A235, A236	"
13.	"	"	57MC	55.25MC 59.75MC	2	"	A237, A238	"

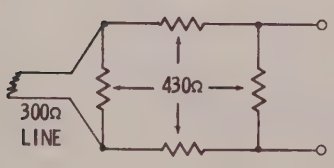
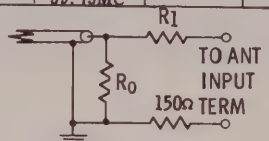


FIG. 201



Zo = Impedance of Cable

Z_0	R_0	R_1
50Ω	56Ω	120Ω
72Ω	82Ω	110Ω
92Ω	110Ω	100Ω

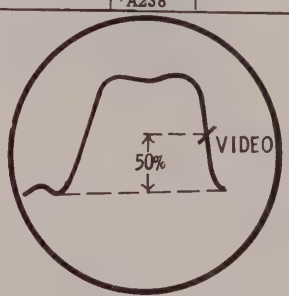


FIG. 202

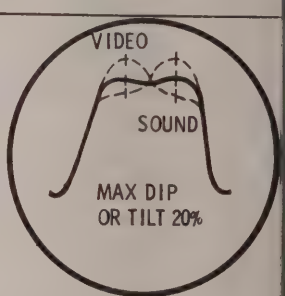
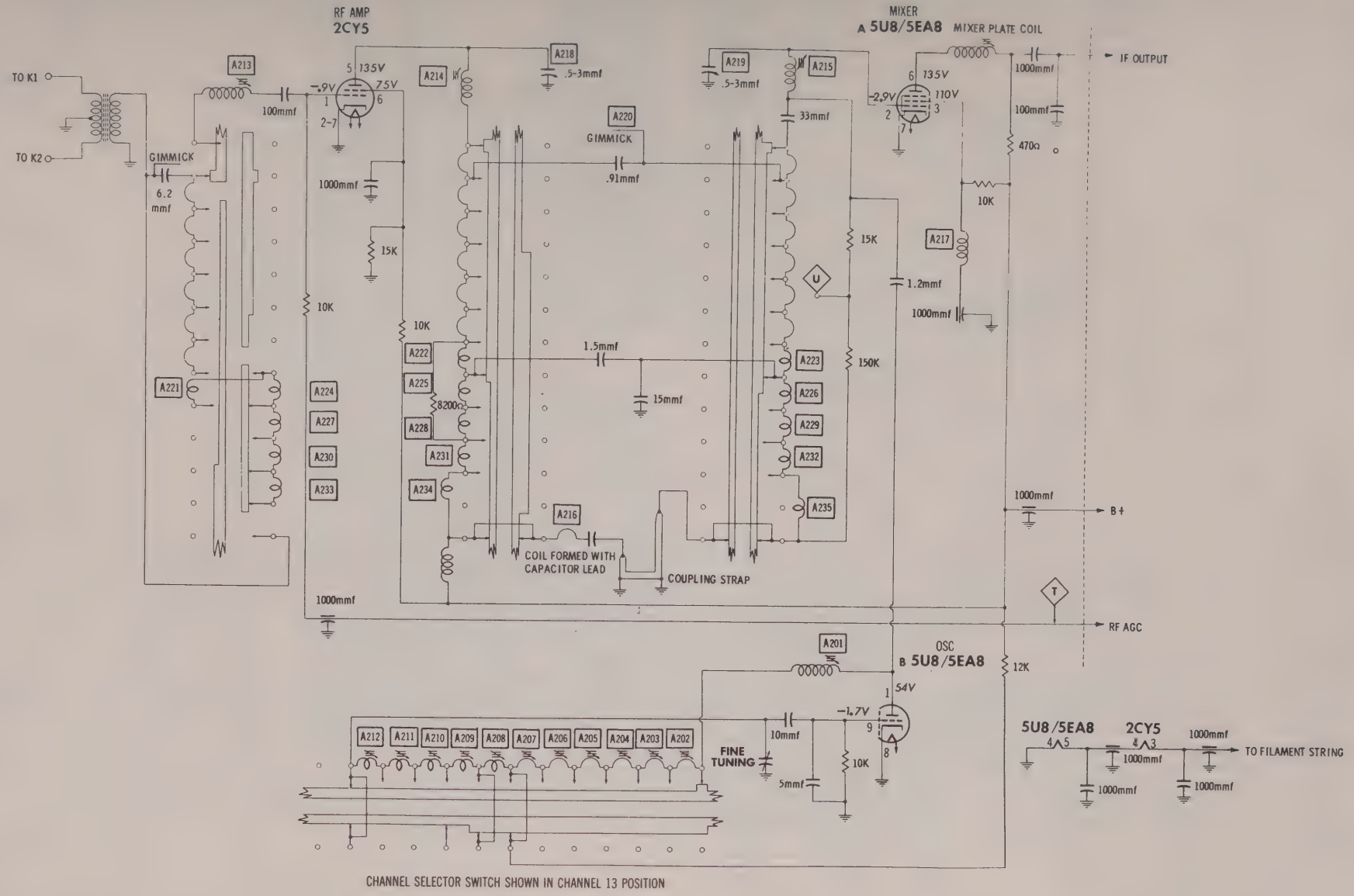


FIG. 203



A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1958

VHF TUNER #RJX-099

HOTPOINT MODELS 14520B, 14520D & UHF (Q3 Line)

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS FOR TUNERS #RJX-099, #RJX-100

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT .
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VHF OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Set the Fine Tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 201	Across antenna terminals thru matching network (Fig. 201).	213MC	211.25MC	13	Vert. Amp. thru 47K across video det. load.	A201	Adjust to place sound marker in trap notch as in Fig. 202.
			207MC	205.25MC	12		A202	
			201MC	199.25MC	11		A203	
			195MC	193.25MC	10		A204	
			189MC	187.25MC	9		A205	
			183MC	181.25MC	8		A206	
			177MC	175.25MC	7		A207	
			85MC	83.25MC	6		A208	
			79MC	77.25MC	5		A209	
			69MC	67.25MC	4		A210	
			63MC	61.25MC	3		A211	
			57MC	55.25MC	2		A212	

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 3 volt bias supply to point (T). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Fig. 201	Across VHF antenna terminals thru matching network (Fig. 201).	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point (U). Low side to chassis.	A213, A214, A215, A216, A217	Adjust for maximum gain and symmetry similar to Fig. 203 with markers as shown. Adjust bandwidth by changing position of A216 with respect to capacitor. If dip is excessive, adjust A217 only SLIGHTLY to prevent loss of gain.
3.	"	"	177MC	175.25MC 179.75MC	7	"	A218, A219, A220	Adjust for maximum gain and symmetry of response similar to Fig. 203 with markers as shown . Adjust bandwidth by repositioning the "Gimmick" wire (A220) with respect to adjacent capacitor. Recheck step 2.
4.	"	"	207MC	205.25MC 209.75MC	12	"		Check for correct tilt on each channel. If necessary make compromise adjustments of A218 and A219 for best tilt on all channels.
			201MC	199.25MC 203.75MC	11			
			195MC	193.25MC 197.75MC	10			
			189MC	187.25MC 191.75MC	9			
			183MC	181.25MC 185.75MC	8			
5.	"	"	85MC	83.25MC 87.75MC	6	"	A221, A222, A223	Adjust for maximum gain and symmetry of response similar to Fig. 203 with markers as shown.
6.	"	"	79MC	77.25MC 81.75MC	5	"	A224, A225, A226	Check tracking. Adjust for proper response if necessary.
7.	"	"	69MC	67.25MC 71.75MC	4	"	A227, A228, A229	"
8.	"	"	63MC	61.25MC 65.75MC	3		A230, A231, A232	"
9.	"	"	57MC	55.25MC 59.75MC	2	"	A233, A234, A235	"

CHASSIS-TOP VIEW

HOTPOINT MODELS 14S208, 14S209 & UHF (Q3 Line)

FOLDER 2

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Turn the Volume fully counterclockwise and the Contrast fully clockwise.
Connect the negative lead of a 3 volt bias supply to point (A). Positive to chassis.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough generator output to provide a usable indication on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over Mixer-Osc. tube (V202). Low side to chassis.	44.3MC (Unmod)	Any non-interfering channel	DC probe thru 22K to point (B). Common to chassis. (Across Video Detector Load)	Al & Mixer Plate Coil	Adjust for maximum deflection.
2.	"	"	45.3MC	"	"	A2	"
3.	"	"	43.3MC	"	"	A3	"

OVERALL VIDEO IF RESPONSE CHECK

Connect bias as under "Video IF Alignment".
Calibrate scope to produce 2 inches of deflection from 3 volts of signal.
Adjust sweep output to produce 2 inches of deflection on the scope at all times.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to ungrounded tube shield floating over Mixer-Osc. tube (V202). Low side to chassis.	44.3MC (10MC Swp)	41.25MC 42.85MC 44.3MC 45.0MC 45.75MC	Any non-interfering channel	Vert. Amp. thru 22K to point (B). Low side to chassis. (Across Video Det. Load)		Check for response similar to Fig. 1 with markers as indicated. If necessary, retouch A3 to place 42.85MC marker at 40%, A2 to place 45.75MC at 40%, and Al and Mixer Plate Coil for peak region symmetry. The 41.25MC marker is very critical and should be kept between 4% and 6%.

4.5MC TRAP ALIGNMENT

Set the Contrast fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	.001mfd	High side to point (B). Low side to chassis.	4.5MC (400∿ 30% AM Mod)	Any non-interfering channel	High side thru detector network (Fig. 2) to point (C). Low side to chassis.	A4	Adjust for MINIMUM deflection.

SOUND IF ALIGNMENT

Set the AM Reject to the center of its mechanical range.
Set the Volume fully clockwise.
If a 4.5MC generator of crystal accuracy is not available, a TV station signal may be substituted.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	.001mfd	High side to point (B). Low side to chassis.	4.5MC (400∿ FM Mod. 50KC Swp)	Any non-interfering channel	Across voice coil of speaker	A5	Adjust for maximum 400∿ indication. Peak with slug nearest printed board.
7.	"	"	"	"	"	A6	Adjust for maximum 400∿ on scope.
8.	"	"	"	"	"	A7	Adjust for maximum 400∿ on scope. Peak with slug farthest away from printed board. Repeat steps 6, 7 and 8.

9. Connect antenna leads to antenna terminals and tune in a strong TV signal. Select the channel which exhibits the most buzz when tuned SLIGHTLY into audio. Set Fine Tuning to a point in audio where the picture is still in sync. This will amplify any existing buzz that is present. Adjust the AM Reject (R7) for MINIMUM buzz. If no buzz is present regardless of Fine Tuning position, leave control at center of rotation. Never set R7 fully clockwise and leave it there.

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGES 6, 8 & 13.

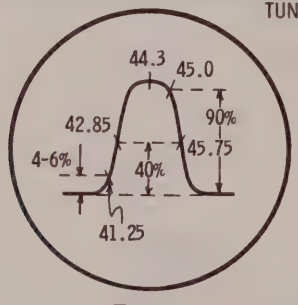


FIG. 1

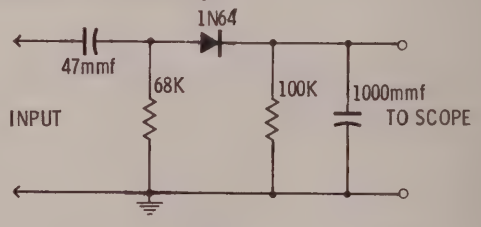
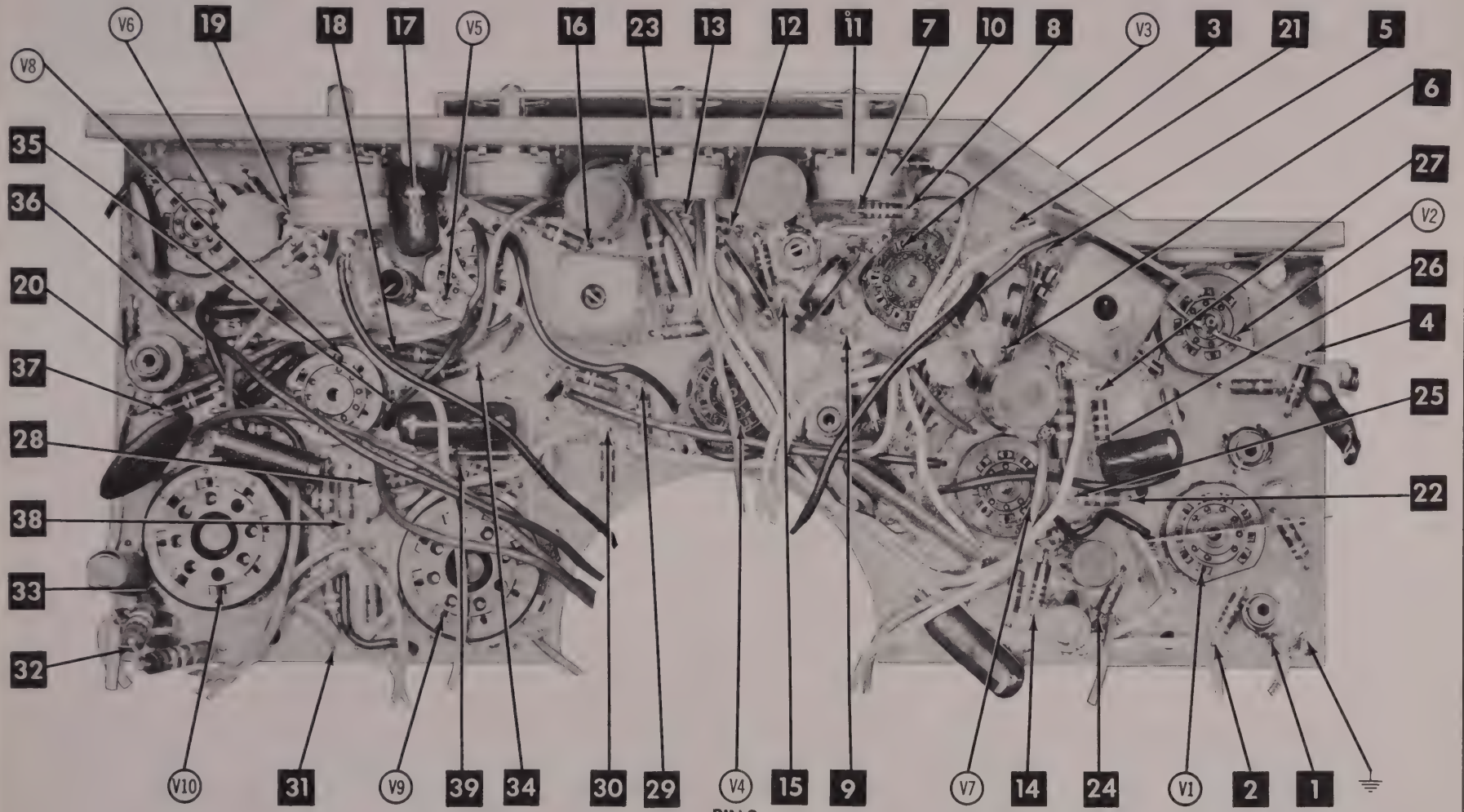


FIG. 2



PIN 2

A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK

PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	1st Video IF Amp - Vert. Mult.	5DH8	
V2	2nd Video IF Amp	3CB6	
V3	Video Output-Sync Sep	6AU8A	
V4	Sound IF Amp	3AL6	
V5	Audio Detector	3AV6	
V6	Audio Output	12CA5	
V7	Vert. Mult. - Vert. Output	12H5	
V8	Horiz. Mult.	6CU7	
V9	Horiz. Output	25EC6	
V10	Damper	12D4	
V11	HV Rectifier	1X2A	

PICTURE TUBE

ITEM No	REPLACEMENT DATA				NOTES
	HOTPOINT PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	SYLVANIA PART No.	
V12	14AJP4	14AJP4 ①		14AJP4 ②	① "Aluminized" ② Silver Screen 85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP	VOLT	HOTPOINT PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	375	165	WT31X256	AFH1-24-95	XB0189				PLC-1440
C2A	290	150	WT31X257	AFH4-23-72		FP408 *			R3491 *
B	415	150							
C	470	150							
D	100	10							

* Non-catalog item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	HOTPOINT PART No	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No	
C3	.1	600	WT25X24	P68SN-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C4	270		RCW-3327		DS-271	LDT27		MS-327	10%
C5	820		RCW-3383			1R5T82		MS-382	10%
C6	1.8		RCW-3332						NPO ± .25mmf
C7	5		RCW-3057		DTZ-4RT				NPO 5%
C8	.047	200	RCB-046						10%
C9	33		RCW-3369		DTZ-33				NPO 5%
C10	.1	600	RCB-046						10%
C11	8000		RCW-3348	BPD-005	DD-802	BYA10D6	DC535	5HK-D6	
C12	5		RCW-3057		DTZ-4RT				NPO 5%
C13	20		RCW-3178		DTZ-20				NPO 5%
C14	2200		RCW-3340			1R5D22			10%
C15	8000		RCW-3084	BPD-005	DD-802	BYA10D6	DC535	5HK-D6	
C16	.15	400	RCB-033	P48N-15		BC6P15J		4GE-P15	
C17	100		WT18X90	1468-0005	DD-101	32B1571	MCB235	MS-31	10%
C18	.047	200	WT25X33	P28SN-047	DF-503	CUB3B47	GEM-4147	2TM-S47	
C19	100		WT18X245						M160 10%
C20	680		RCW-3367		DS-681	1R5T68		MS-368	10%
C21	10000		RCW-3188	BPD-01	DD-103	BYA881	DC511	5HK-S1	
C22	10000		RCW-3388	BPD-01	DD-103	BYA881	DC511	6HK-S1	
C23	5000		RCW-3348	BPD-005	DD-802	BYA10D6	DC535	5HK-D6	
C24	2200		RCW-3300			1R5D22		MS-233	10%
C25	.027	300	WT25X31						10%
C26	.015	600	RCB-033						10%
C27	.047	300	RCB-045						10%
C28	.047	1000	RCB-048						10%
C29	800		RCW-3037						
C30	.01	1000		P10SN-01		CUB10B1	GEM-1011	10TM-S1	
C31	.01	1000		P10SN-01		CUB10B1	GEM-1011	10TM-S1	
C32	1200		RCW-3187			1R5D12		MS-312	10%
C33	820		RCW-3382			1R5T82		MS-382	10%
C34	10000		RCW-3304						10%
C35	.1	600	WT25X24	P68SN-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C36	2200		WT18X82	1464-0022		1R5D22		MS-222	10%
C37	1000		WT18X39	1464-001		1R5D1	MCE355	MS-21	5%
C38	15			N750-ST 39	TCN-39	C15Q39U			N750 10% ①
C39	2350		RCW-3185			1R5D39		MS-239	10%
C40	330		RCW-3326		DS-301	L10T3		MS-33	10%
C41	.15	600		P68SN-15		CUB6P15	GEM-6015	6TM-P15	
C42	570	3000	WT18X64						N2200 10%
C43	1850		RCW-3187			1R5D18		MS-212	10%
C44	500	15000	RCW-3325	UV-502	TV-20	MMU200T5	HV30035A	20DK-T5	
C45	680		RCW-3037						
C46	800		RCW-3037						
C47	800		RCW-3037						
C48	800		RCW-3037						
C49	800		RCW-3037						
C50	800		WT18X64						
C51	1000	1000	RCW-3329	HVD-15-1000	DD-102		DC302I	BL-D10	
C52	.01	600	WT 25X22	P68SN-01	DS-103	CUB6S1	GEM-611	6TM-S1	
C53	10000	1400	WT18X280	DAC-27	DD16-103	HVB16S1		BL-S10	
C54	2000	1400	RCW-3331	DAC-2	DD30-102	HVB16D1	DC302I	BL-D10	
C55	2000	1400	RCW-3331	DAC-2	DD30-102	HVB16D1	DC302I	BL-D10	
C56	2000	1400	RCW-3331	DAC-2	DD30-102	HVB16D1	DC302I	BL-D10	
C57	100		RCW-3037	BPD-0008	DD-801	L10T8		5GA-T8	
C58	8		RCW-3082						NPO ± .25mmf

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	HOTPOINT PART No	CENTRALAB PART No	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No	
R1	500 K	½	WT49X267					Volume & Switch
R2	200 K	½	RRC-427					Brightness
R3	2.5meg	½	RRC-402					Vert. Hold
R4	1K	½	RRC-428					Contrast
R5A	1meg	½	RRC-395	AB-89	A47-1meg-S	Q11-137	PTA1254L	Horiz. Hold
B	Shaft			AK-49	RN-3	TQ	Not Req.	
R5A	5meg	½	WT49X268					Vert. Lin. Height
B	400 K	½						
R7	3000Ω	2(WW)	RRC-305		39-3000		FL-2.5K	AM Reject.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	HOTPOINT PART No.	NOTES
R8	2.2meg			
R9	20meg 5%			
R10	22Ω			
R11	8200Ω			
R12	560Ω			
R13	47Ω			
R14	2250Ω			
R15	58Ω			
R16	180K			
R17	4700Ω			
R18	1meg			
R19	4700Ω	2		
R20	82Ω			
R21	27K			
R22	5800Ω			
R23	220K			
R24	18meg			
R25	18meg			
R26	390K			
R27	100K			
R28	100K			
R29	12K	1		
R30	100Ω			
R31	12K			
R32	150K			
R33	22K			
R34	10meg			
R35	1meg			
R36	22Ω			
R37	120Ω			
R38	1.5meg			
R39	33K			
R40	100K			
R41	330K			
R42	1.5meg			
R43	330K			
R44	22K	1		
R45	47K			
R46	2200Ω			
R47	2200Ω			
R48	3300Ω			
R49	47K			
R50	4.7meg 5%			
R51	75K 5%			
R53	270K			
R53	220K			
R54	1meg			
R55	47K			
R56	15K 5%			
R57	820K			
R58	120K			
R59	150K			
R60	1000Ω 5%			Note 1
R61	1.5meg			
R62	18K			
R63	470Ω			
R64	220K			
R65	270K	1		
R66	270K	1		
R67	.68Ω		RRW-181	
R68	2Ω	15	WT14X127	
R69	5Ω	10	RRW-170	
R70	680Ω	2		
R71	470K			
R72	820K			Note 2
R73	820K			Note 2

Note 1. Some versions may use 1100Ω 5% in this application.
Note 2. Some versions may use 1meg in this application.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: HOTPOINT PART No	Halldorson PART No	Merit PART No	Ram PART No.	Stancor PART No	Thordarson PART No	Triad PART No.	NOTES
T1	Vert. Output	RTO-209	Z1900①		V316	A-8147	25S75 ① Y-51	A-118X ②	
T2A	Yoke-Horiz. (12.6MH)	RLD-080							
B	(110°)-Vert. (43MH)				X171 *	HO-298 *			
T3	Horiz. Output	RTO-207-9			X171 *	HO-298 *			
	Alt. Horiz. Output	RTO-207							
	Yoke Clamp	RMX-377							

① Use 8 to 1 turns ratio. Connect as autoformer.
② Use 5.5 to 1 turns ratio.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
4			4	4		
5			5	5		
6			6	6		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: HOTPOINT PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T4	3600Ω	3-4Ω	RTO-210	Z1105 ①	A-3018 ①	AU-808 ①	A-3328	24S48	S-6X	① Drill new mounting hole.

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA: HOTPOINT PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	ROP-035	4A07	

COILS (RF-IF)

ITEM No	USE	REPLACEMENT DATA: HOTPOINT PART No	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No	NOTES
L1	1st. Video IF	RLI-361					
L2	2nd. Video IF	RTL-215					
L3	3rd. Video IF	RLI-422					Includes L4, L5, L6, L7
L4	RF Choke	RLI-423 †					1.2 Microhenries ①
L5	RF Choke	†					.22 Microhenry
L6	RF Choke	†					31 Microhenries
L7	RF Choke	RLI-450 †					7.8 Microhenries ①
L8	Series Peaking Coil	WT36X366					82 Microhenries
L9	4.5MC Trap	RLI-426					
L10	Shunt Peaking Coil	WT63X370	19-3500	TV-188	6174	VP-8	510 Microhenries
L11	Series Peaking Coil	WT36X367	19-3250	TV-198	6130	VP-6	270 Microhenries
L12	1st. Sound IF	WT36X368					
L13	2nd. Sound IF	WT63X81					
L14	Discriminator	WT36X369					
L15	RF Choke	RLI-428			4611		8.2 Microhenries
L16	RF Choke	RLI-429			4611		8.2 Microhenries
L17	Line Choke	RLI-420					120 Microhenries

† Part of L3. ① IRC Part #CLA.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES PRI.	DC RES SEC.	REPLACEMENT DATA: HOTPOINT PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No	Thordarson PART No.	NOTES
L18	7Ω		RLI-424						

FILTER CHOKE

ITEM No.	RATINGS CURRENT (Measured)	RATINGS DC RES.	RATINGS INDUCTANCE (0 CURRENT 1000 ^)	REPLACEMENT DATA: HOTPOINT PART No.	Halldorson PART No	Merit PART No	Ram PART No.	Stancor PART No	Thordarson PART No	Triad PART No
L19	260A	24Ω	.7 Hy.	RLF-078					26C44	C-27X ①

① Drill new mounting hole.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	HOTPOINT PART No.	REPLACEMENT DATA	
K1	Antenna Isolation	470mmf ② 1500VAC, .3-1meg	RCR-002	Centralab	RC-471
				Sprague	R-9177
K2	Antenna Isolation	470mmf ② 1500VAC, .3-1meg	RCR-002	Centralab	RC-471
				Sprague	R-9177
K3	Vert. Integrator	3000mmf, 800mmf, 180mmf, 130mmf, 100K, 68K, 47K, 47K	WT33X19		
K4	Sync	470mmf, 470K	RCR-003	Centralab	RC-465
				Sprague	R-9176
K5	Isolation	470mmf ② 1500VAC, 1meg	RCR-006	Centralab	RC-490
				Sprague	R-9177

RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA: HOTPOINT PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.300A	RER-031		1N1008 ①		M500②	① Germanium type. ② Silicon type.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: HOTPOINT PART No. FUSE	HOTPOINT PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2	C	3A 250V	WT10X34	WT8X81	332003 (C-3A-250V)	346007	C3	HC 3½ to 3½

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: HOTPOINT PART No.	CBS PART No.	SYLVANIA PART No.	NOTES
M3		RED-001	1N60	1N60	Video Det. (Pigtail)
M4		RED-006	1N67A	1N38A	Horiz. AFC (Pigtail)
M5		RED-006	1N67A	1N38A	Horiz. AFC (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	HOTPOINT PART No.	NOTES
M6	Tuner	RJX-097	VHF
	Tuner	RJX-099	VHF
	Tuner	WT56X79	VHF
	Tuner	RJX-100	UHF-VHF
	Tuner	WT85X21	UHF
M7	Centering Device	REA-019	
M8	Ion Trap	RET-018	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

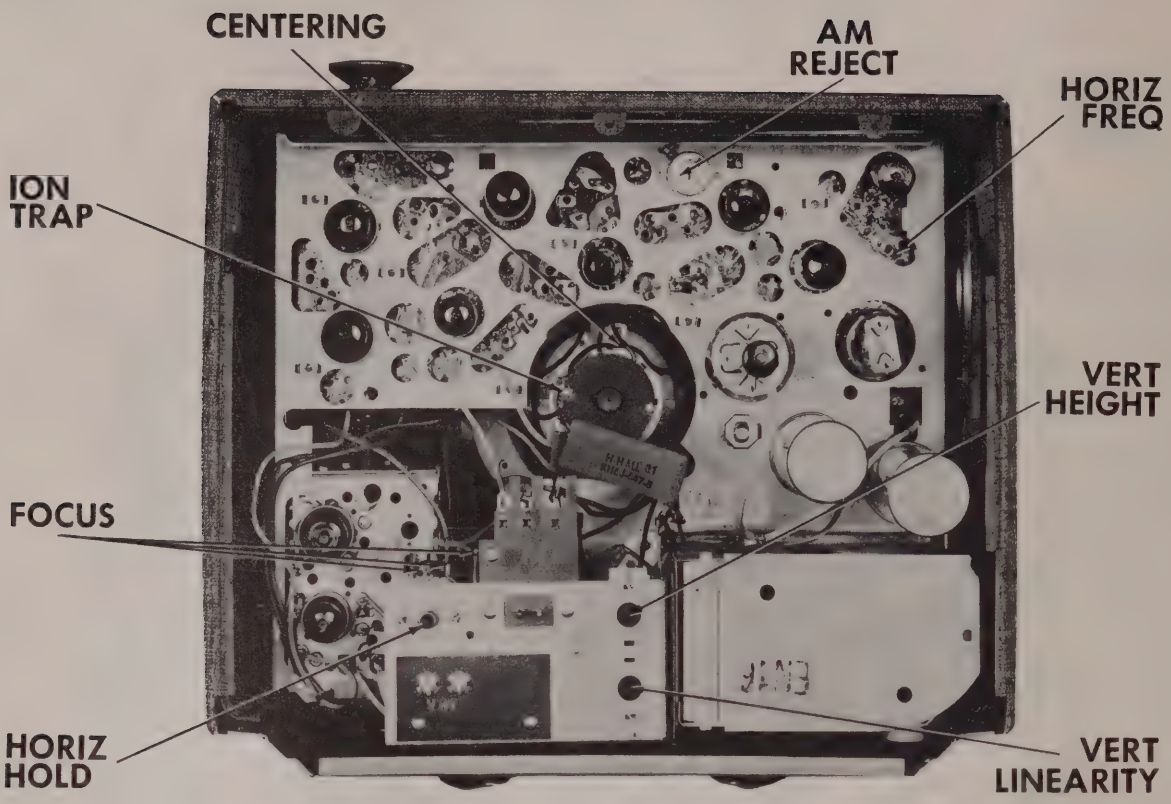
NAME	PART NO.	DESCRIPTION
Safety Glass	HDW-002	
Knob	HDK-014	VHF Channel Selector (White)
Knob	HDK-015	Tuning (White)
Knob	HDK-016	Tuning (Clear)
Knob	HDK-013	Secondary Controls
Dial	HDK-017	UHF
Cabinet Back	HAB-018	Beige
Cabinet Front	HAC-010	White
Cabinet Rear	HAV-048	Model 14S208
Cabinet Rear	HAV-049	Model 14S209
Handle	HHY-002	

WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8534 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

CHASSIS BOTTOM VIEW

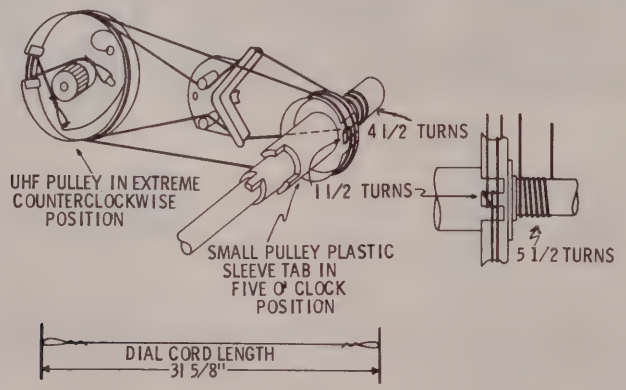
HOTPOINT MODELS 14S208, 14S209 & UHF (Q3 Line)



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Tune the receiver to a weak signal and adjust the controls for a normal picture. Connect a short clip lead from point Ⓓ to point Ⓔ. Connect a 2200Ω resistor from point Ⓕ to point Ⓖ.	Adjust the Horizontal Hold to the point where the picture appears to float back and forth across the screen. Remove the 2200Ω resistor and adjust the Horizontal Frequency (B1) until the picture again appears to float back and forth across the screen. Remove the clip lead from points Ⓓ and Ⓔ.


4 1/2 TURNS
UHF PULLEY IN EXTREME COUNTERCLOCKWISE POSITION
1 1/2 TURNS
5 1/2 TURNS
SMALL PULLEY PLASTIC SLEEVE TAB IN FIVE O' CLOCK POSITION
DIAL CORD LENGTH
31 5/8"

UHF DRIVE CORD STRINGING

TUNER RJX-100 ALIGNMENT INSTRUCTIONS (cont)

UHF IF ALIGNMENT FOR TUNER #RJX-100

Connect the negative lead of a 3 volt bias supply to point (T).
Disconnect the IF link from the grid coil of the 1st. Video IF stage and terminate the open end of the cable or link with a 68Ω resistor.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Set the VHF tuner to the UHF position and adjust the UHF tuning for MINIMUM tilt of the response curve over the center of the tuning area (approximately 620MC).
Remove Germanium Diode from UHF Tuner.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Fig. 204	High side to point (V). Low side to chassis.	43.0MC (10MC Swp)	40.5MC 45.75MC	UHF	Vert. Amp. thru 10K to point (U). Low side to chassis.	A236, A237, A238, A239	Adjust A236 for maximum amplitude at 40.5 MC, A237 for maximum at 45.75MC and A238 for maximum gain and MINIMUM tilt (See Fig. 205). If necessary, adjust position of "Gimmick" (A239) for MINIMUM dip.

UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

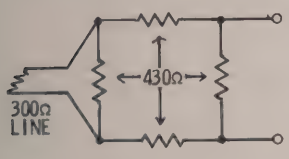
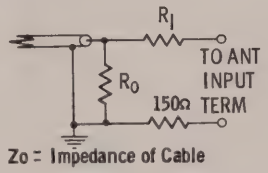


FIG. 201



Z_0	R_0	R_1
50Ω	56Ω	120Ω
72Ω	82Ω	110Ω
92Ω	110Ω	100Ω

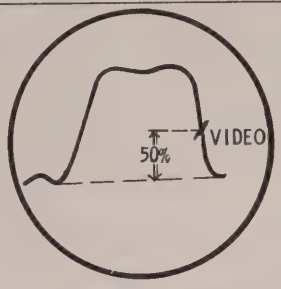


FIG. 202

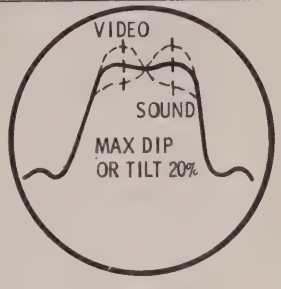


FIG. 203

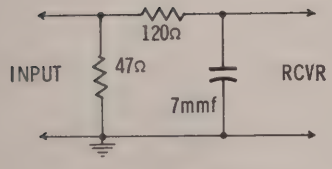


FIG. 204

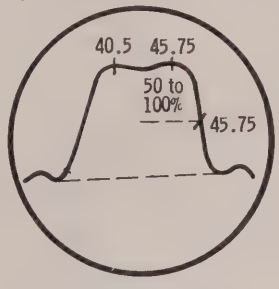
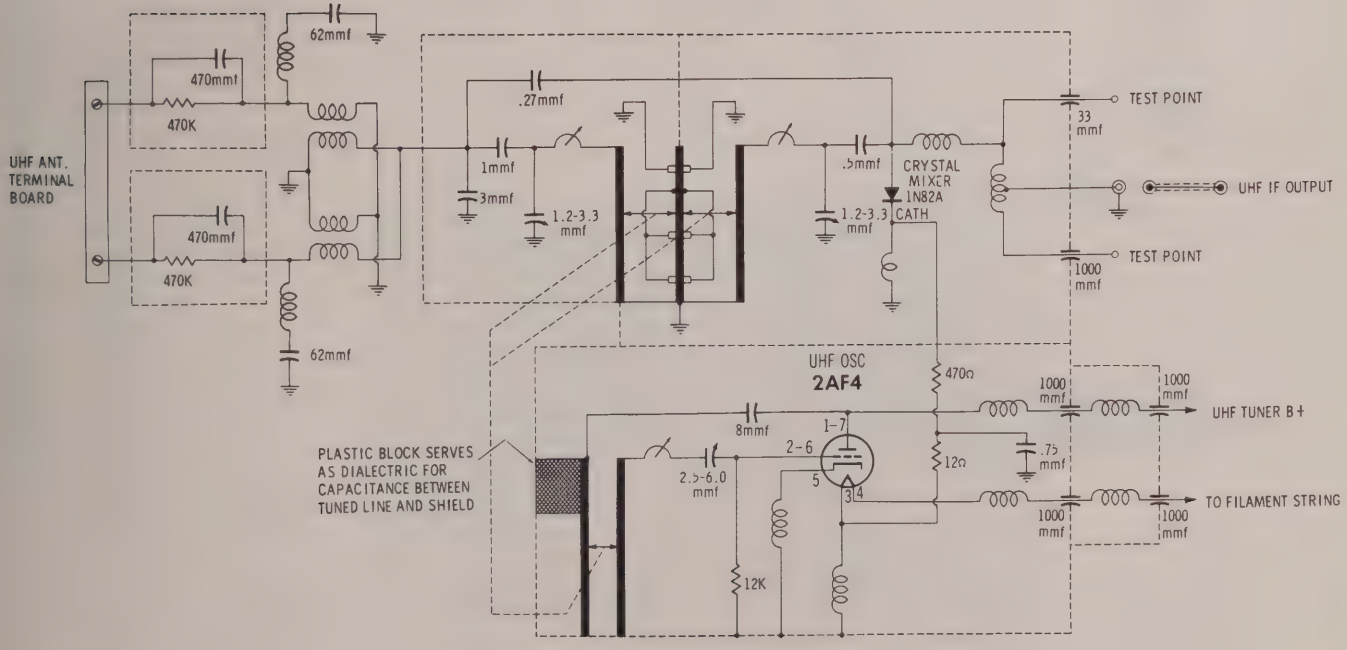


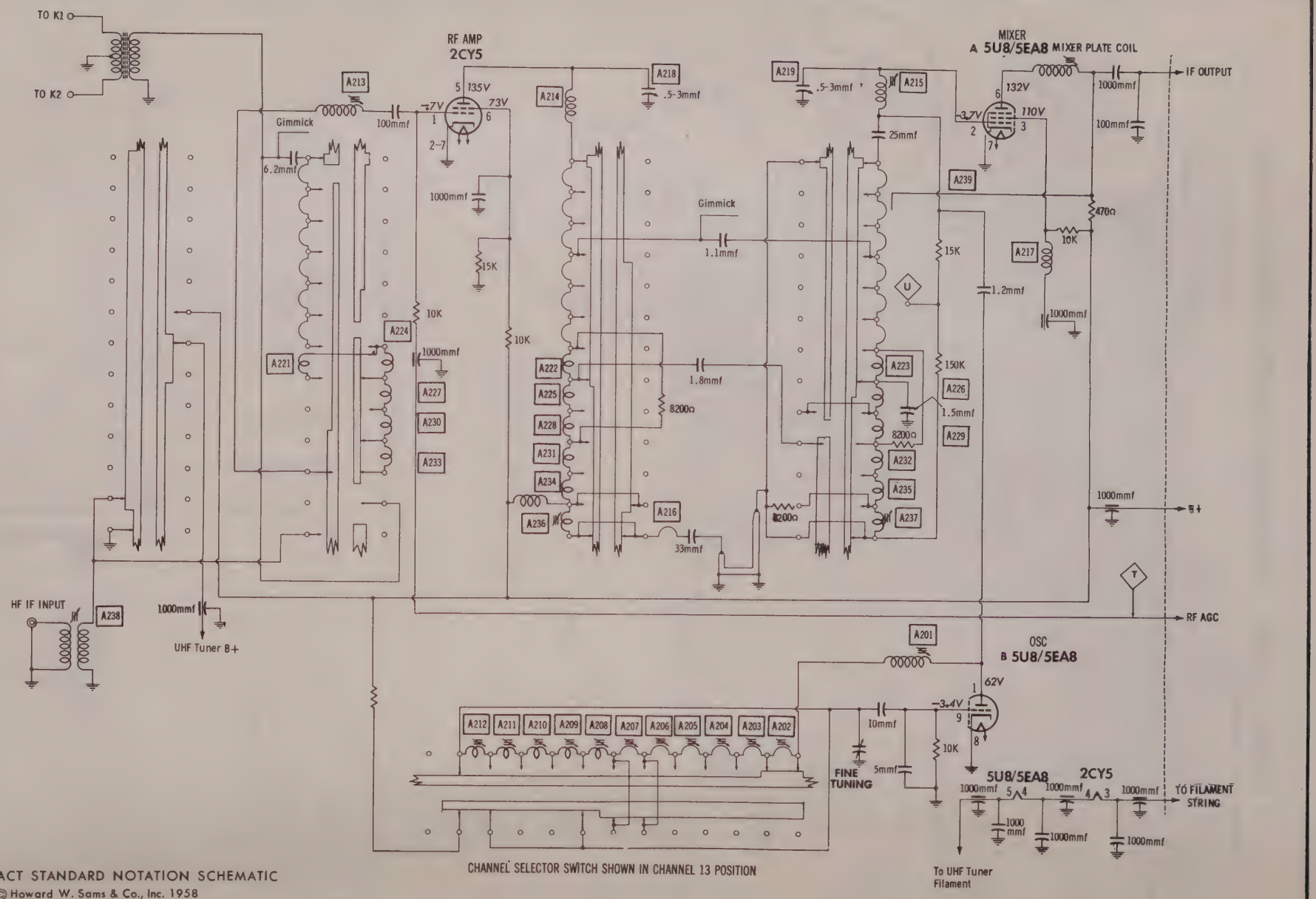
FIG. 205



A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1958

UHF TUNER WT85X21



Tuner #RJX-100 (VHF with UHF provisions)

TUNER PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amplifier	2CY5	

ITEM No.	USE	TYPE	NOTES
V202	Mixer-Osc.	5CL8	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	HOTPOINT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	15		RCW-3314						NPO 10%
C202	1000		RCW-3269	EF-001	MFT-1000			503C-D1	
C203	5		RCW-3113		DTZ-4R7				±.5mmf
C204	1000		RCW-3386	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C205	.39		RCK-031						10%
C206	.56		RCK-034						10%
C207	1.3		RCK-035						10%
C208	.91		RCK-012						10%
C209	47		RCW-3267		DTN-47				N750 5%
C210	100		RCW-3344						N750 5%
C211	30		RCW-2008						NPO 5%
C212	2		RCK-020						5%
C213	1000		RCW-3269	EF-001	MFT-1000			503C-D1	
C214	1000		RCW-3269	EF-001	MFT-1000			503C-D1	
C215	1.5		RCW-3347						N80 ±.25mmf
C216	10		RCW-3348						N330 ±.5mmf
C217			RCY-097						
C218	1000		RCW-3386	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C219	100		RCW-3344						N750 5%
C220	1000		RCW-3386	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C221	1000		RCW-3386	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C222	1000		RCW-3269	EF-001	MFT-1000			503C-D1	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

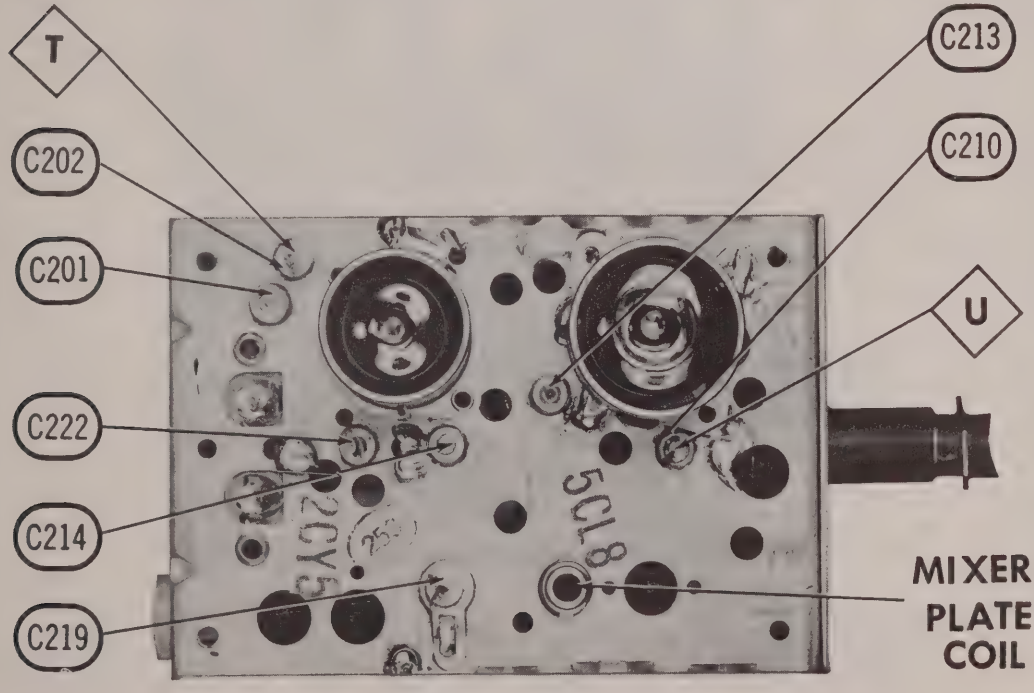
ITEM No.	RATING		HOTPOINT PART No.	NOTES
	OHMS	WATT		
R201	12K			
R202	15K			
R203	10K			
R204	15K			

ITEM No.	RATING		HOTPOINT PART No.	NOTES
	OHMS	WATT		
R205	220K			
R206	15K			
R207	8200Ω			

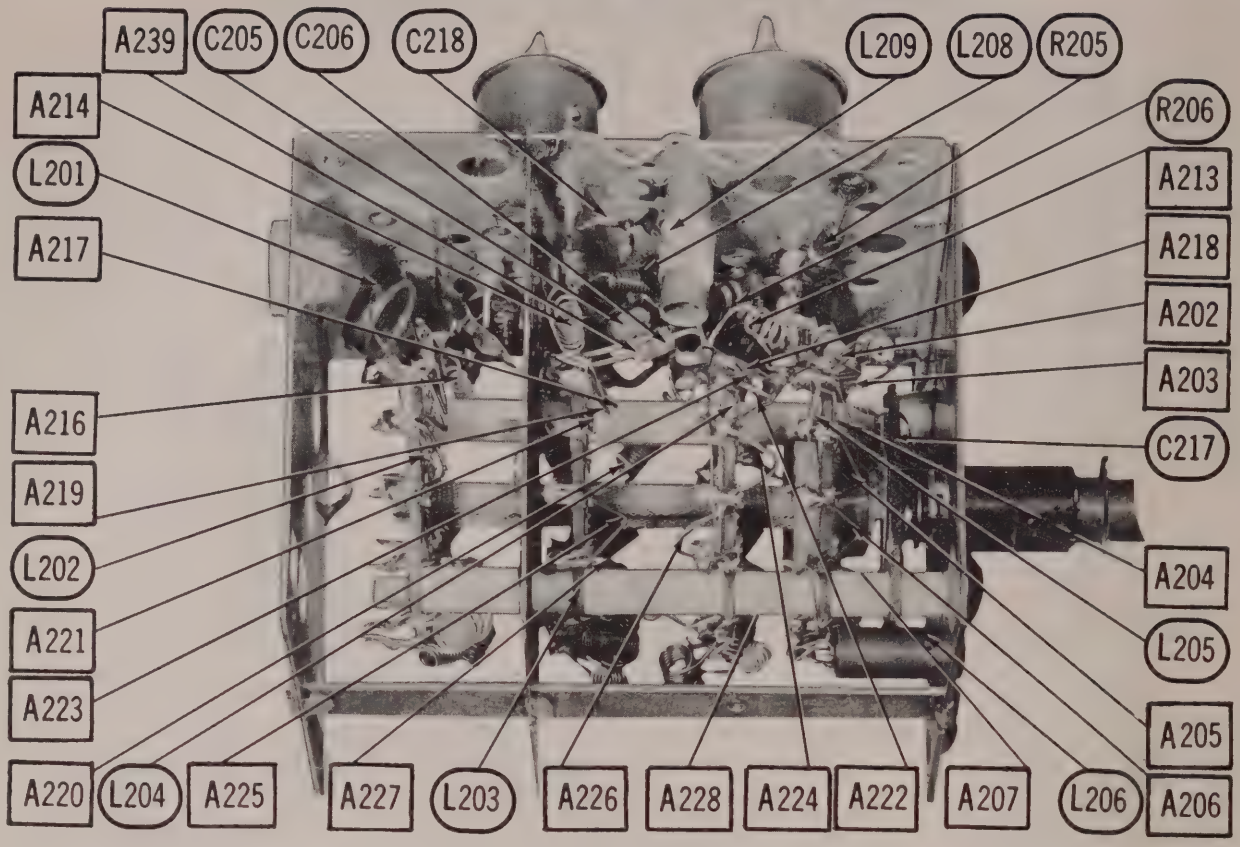
COILS (RF-IF)

ITEM No.	USE	HOTPOINT PART No.	NOTES
L201	Ant. Trans.	RLA-046	
L202	Ant. Coils	RSX-092	Channel 2-13, Wafer Ass'y.
L203	RF Coils	RSX-093	Channel 2-13, Wafer Ass'y.
L204	Mixer Grid Coils	RSX-094	Channel 2-13, Wafer Ass'y.

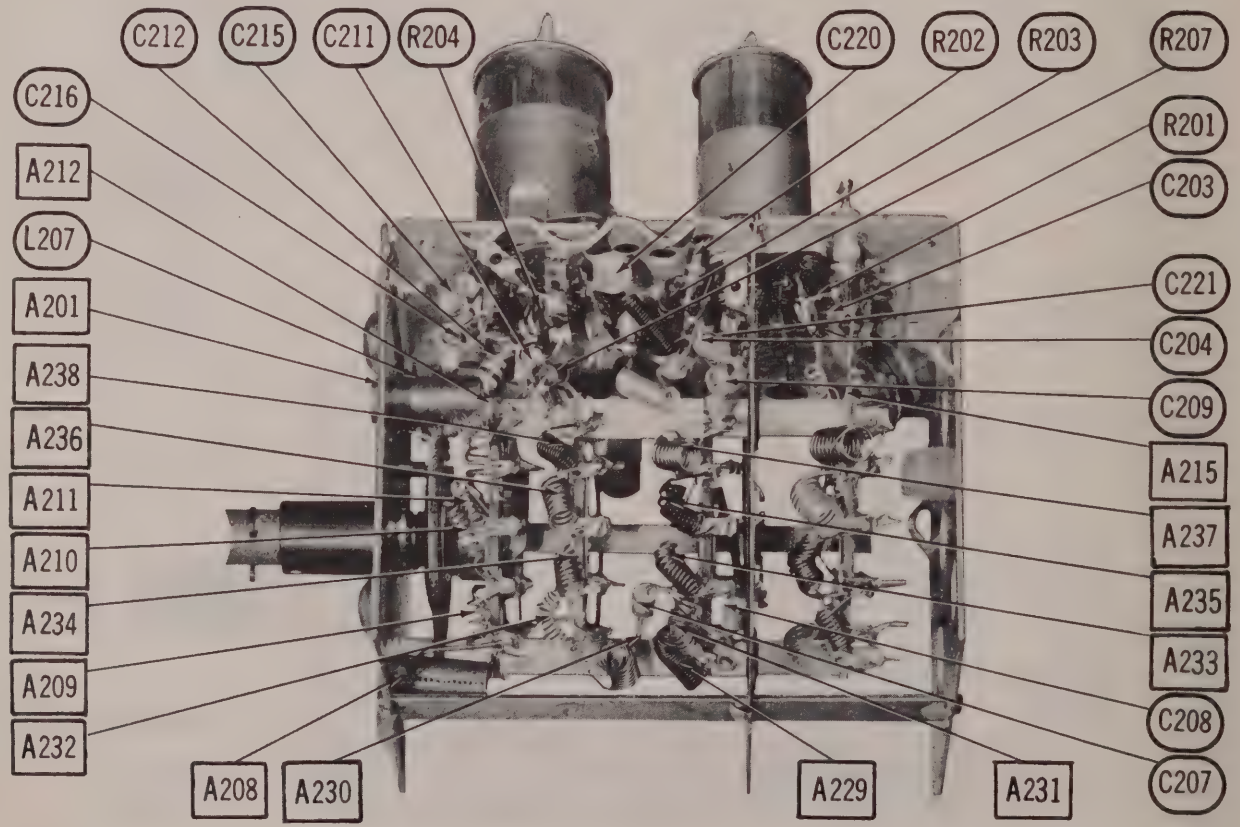
ITEM No.	USE	HOTPOINT PART No.	NOTES
L205	Osc. Coils	RSX-095	Channel 2-13, Wafer Ass'y.
L206	Osc. Coil	RLI-373	Channel 6
L207	Osc. Coil	RLI-417	Channel 13
L208	RF Choke	RLI-436	1.82 Microhenries
L209	Mixer Plate Coil	RLI-374	



RF TUNER—TOP VIEW



RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE

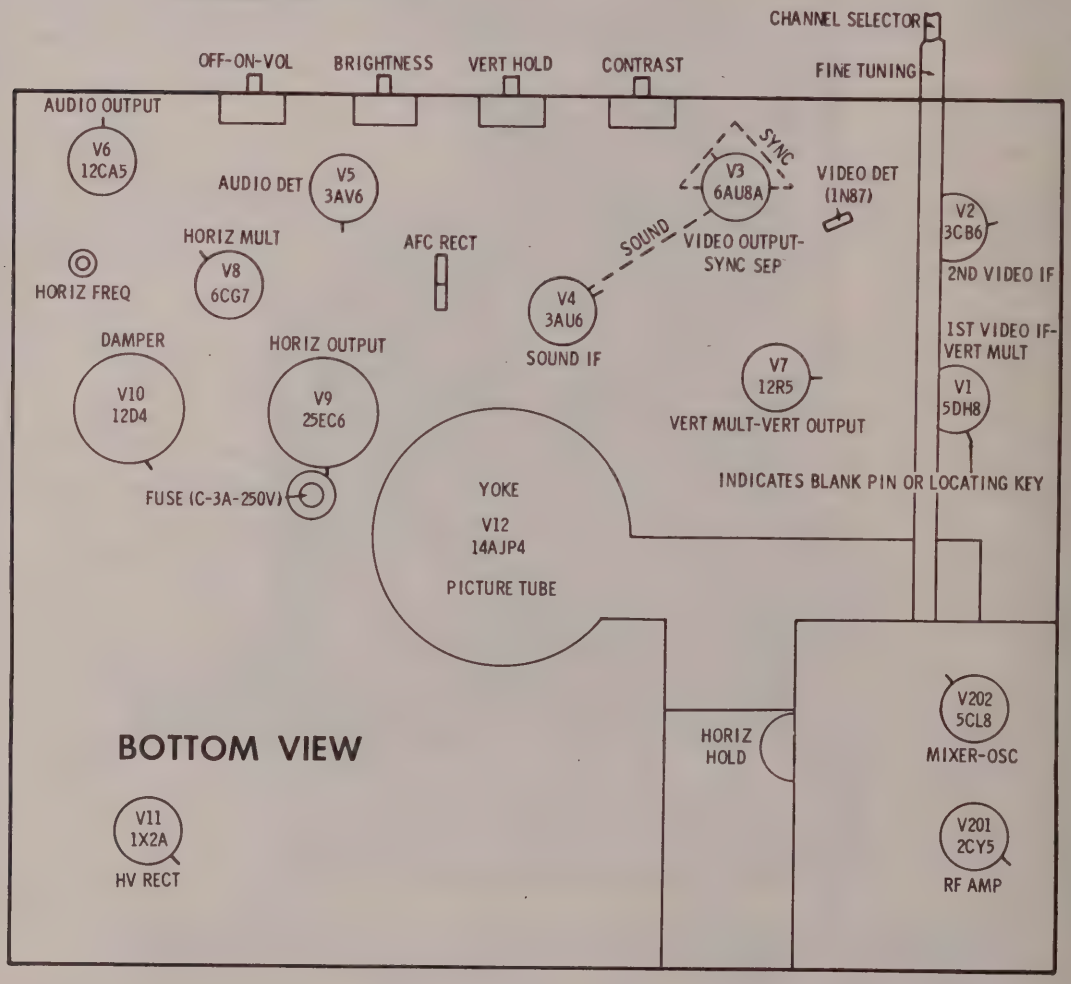
PRINTED BOARD-RESISTOR, INDUCTOR IDENTIFICATION

HOTPOINT MODELS 14S208, 14S209 & UHF (Q3 Line)

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	5DH8	•1.1meg	•‡2.7meg	0Ω	8Ω	9Ω	†580Ω	†580Ω	47Ω	2.3meg
V2	3CB6	.1Ω	56Ω	9Ω	10Ω	†245Ω	†245Ω	0Ω		
V3	6AU8A	0Ω	2.1meg	†23K	11.5Ω	10Ω	82Ω	1meg	†24Ω	†3800Ω
V4	3AU6	2Ω	0Ω	6Ω	5Ω	†7000Ω	†7000Ω	100Ω		
V5	3AV6	10meg	0Ω	4Ω	5Ω	150K	150K	‡1meg		
V6	12CA5	120Ω	0Ω	12.5Ω	14.5Ω	0Ω	†700Ω	†930Ω		
V7	12R5	0Ω	•750K	8Ω	6Ω	•750K	†24Ω	†210Ω		
V8	6CG7	†15K	1.2meg	1000Ω	4Ω	2.5Ω	†150K	•100K	1000Ω	0Ω
V9	25EC6	NC	17Ω	0Ω	NC	1.5meg	NC	22Ω	†24Ω	TOP CAP ‡14Ω
V10	12D4	NC	NC	¶190K	NC	†24Ω	NC	14.5Ω	17Ω	
V11	1X2A	PINS 1 THRU 9 HAVE INFINITE RESISTANCE								TOP CAP ‡334Ω
V12	14AJP4	12.5Ω	47K	‡85K	‡100K	NC	NC	•270K	11.5Ω	
V201	2CY5	2.3meg	0Ω	2.5Ω	1.5Ω	†40Ω	†7000Ω	0Ω		
V202	5CL8	15K	†8200Ω	0Ω	0Ω	1.5Ω	†40Ω	†40Ω	0Ω	235K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 140V SOURCE.
‡ MEASURED FROM PIN 3 OF V10.
NC NO CONNECTION.



TUBE PLACEMENT CHART

SET 414 FOLDER 3

TRAV-LER MODELS 17MT65, 721-K-610, 721-LP-650, 721-MT-600, 1722, 1723, U, 1724 (Ch. 740-78, 743-48, 775-88)

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 2 top and 4 side push-on type knobs.
2. Remove 9 metal screws holding rear cover. Remove rear cover.
3. Remove speaker leads.
4. Remove 6 metal screws (3 on each side) holding top half of cabinet.
5. Remove top half of cabinet.
6. Remove 1 metal screw from side holding control panel.
7. Remove picture tube socket, HV lead and yoke plug.
8. Remove resistor and capacitor isolation network from chassis to cabinet.
9. Remove 2 metal screws from the sides and 2 chassis bolts from the bottom.
10. Remove chassis.

MODEL 1723 (CH. 740-78)

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

TRADE NAME	Trav-Ler	MODELS	CHASSIS
		1723, 1723U	740-78
		17MT65	743-48
		721-K-610, 721-LP-650, 721-MT-600, 1722, 1724	775-88
MANUFACTURER	Trav-Ler Radio & Tele. Corp., 571 West Jackson Blvd., Chicago 6, Illinois		
TYPE SET	Television Receiver		
TUBES	Fifteen		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING 140 Watts, 1.37 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

TRAV-LER MODELS 17MT65, 721-K-610, 721-LP-650, 721-MT-600, 1722, 1723, U, 1724 (Ch. 740-78, 743-48, 775-88)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF Oscillator is possible by removing the rear cover, and supplying power to the receiver. Set the Fine Tuning at the center of its range. The adjustments are accessible, one at a time, thru a hole in the right side of the tuner rear cover as viewed from the rear. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube, and safety glass cleaning, it is necessary to remove the chassis. (See disassembly instructions.)

SPECIAL ADJUSTMENTS

A. AGC

Observe the picture and advance the AGC control to a point where the picture distorts or a buzz is heared in the sound. Back off from this setting until the picture becomes stable with no noise in the sound.

B. Focus

No provision is made to vary the focus on this receiver.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

For adjustment of the Horizontal Oscillator, it is necessary to remove the rear cover and supply power to set. Set the Horizontal Hold at the center of its range and adjust the Horizontal Frequency slug (B1) until the picture synchronizes horizontally. (For location, see tube placement chart.)

FUSE DEVICE

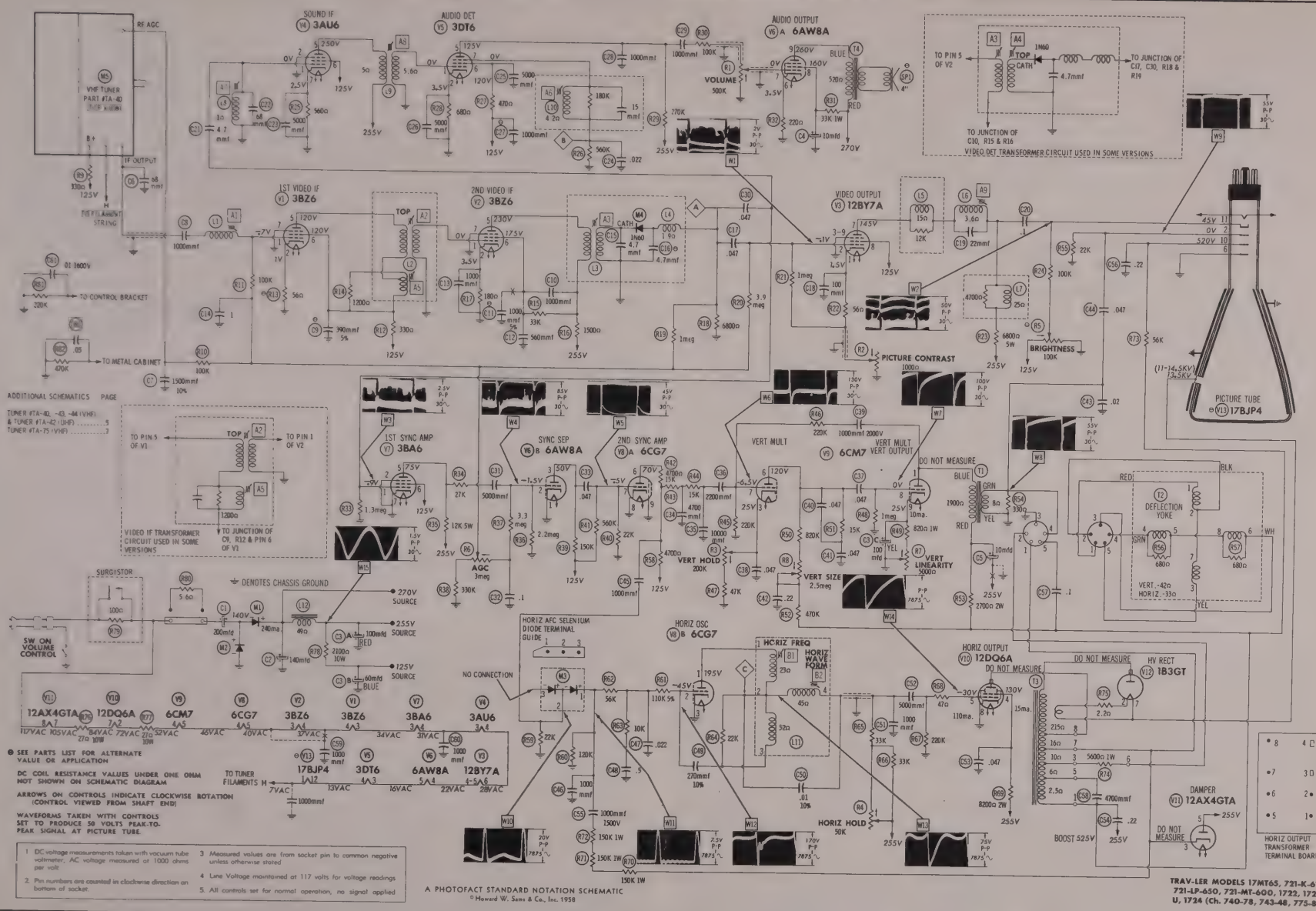
A 5.6Ω fusible resistor (R80) is used for low voltage power supply protection. (For location, see tube placement chart.)

CENTERING

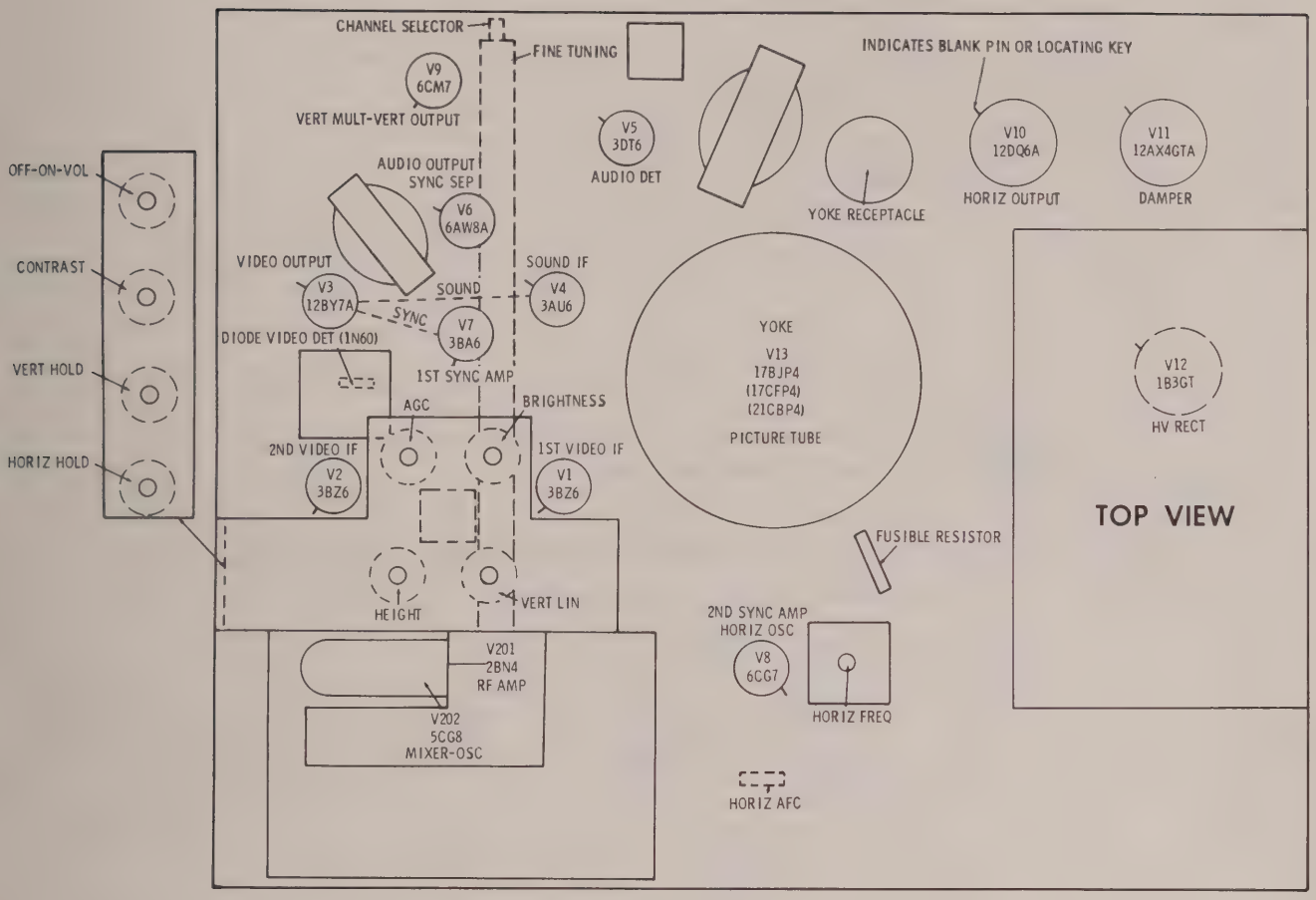
Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana . . Printed in U.S. of America


SOUND IF V4 3AU6
AUDIO DET V5 3DT6
AUDIO OUTPUT V6A 6AW8A
VOLUME 500K
TO PIN 5 OF V2
TO JUNCTION OF C17, C30, R18 & R19
TO JUNCTION OF C10, R15 & R16
VIDEO DET TRANSFORMER CIRCUIT USED IN SOME VERSIONS
RF AGC
VHF TUNER PART #TA-40
IF OUTPUT
1ST VIDEO IF V1 3BZ6
2ND VIDEO IF V2 3BZ6
VIDEO OUTPUT V3 12BY7A
PICTURE CONTRAST
BRIGHTNESS 100K
TO CONTROL BRACKET
TO METAL CABINET
PICTURE TUBE V13 17BJP4
1ST SYNC AMP V7 3BA6
SYNC SEP V6B 6AW8A
2ND SYNC AMP V8A 6CG7
VERT MULT V5 6CM7
VERT MULT VERT OUTPUT
DO NOT MEASURE
VERT HOLD 200K
VERT SIZE 2.5meg
VERT LINEARITY 5000Ω
DEFLECTION YOKE
VERT.-42Ω HORIZ.-33Ω
AGC 3meg
ADDITIONAL SCHEMATICS PAGE
TUNER #TA-40, -43, -44 (VHF) & TUNER #TA-42 (UHF) 5
TUNER #TA-75 (VHF) 7
TO PIN 5 OF V1
TO PIN 1 OF V2
TO JUNCTION OF C9, R12 & PIN 6 OF V1
VIDEO IF TRANSFORMER CIRCUIT USED IN SOME VERSIONS
SURGISTOR
SW ON VOLUME CONTROL
DENOTES CHASSIS GROUND
270V SOURCE
255V SOURCE
125V SOURCE
HORIZ AFC SELENIUM DIODE TERMINAL GUIDE
NO CONNECTION
HORIZ OSC V8B 6CG7
HORIZ FREQ
HORIZ WAVE FORM
HORIZ OUTPUT V10 12DQ6A
HV RECT V12 1B3GT
DAMPER V11 12AX4GTA
BOOST 525V
HORIZ OUTPUT TRANSFORMER TERMINAL BOARD
V11 12AX4GTA 117VAC 105VAC
V10 12DQ6A 84VAC 72VAC
V9 6CM7 27Ω 10W
V8 6CG7 46VAC
V2 3BZ6 40VAC
V1 3BZ6 37VAC
V7 3BA6 34VAC
V4 3AU6 31VAC
TO TUNER FILAMENTS H
V13 17BJP4 7VAC
V5 3DT6 13VAC
V6 6AW8A 16VAC
V3 12BY7A 22VAC
4-5&6 28VAC
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.
1. DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1000 ohms per volt
2. Pin numbers are counted in clockwise direction on bottom of socket
3. Measured values are from socket pin to common negative unless otherwise stated
4. Line Voltage maintained at 117 volts for voltage readings
5. All controls set for normal operation, no signal applied
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1958
TRAV-LER MODELS 17MT65, 721-K-610, 721-LP-650, 721-MT-600, 1722, 1723, U, 1724 (Ch. 740-78, 743-48, 775-88)

TUBE PLACEMENT CHART



TRAV-LER MODELS 17MT65, 721-K-610, 721-LP-650, 721-MT-600, 1722, 1723, U, 1724 (Ch. 740-78, 743-48, 775-88)

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

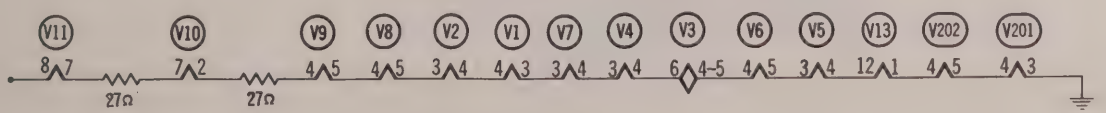
POWER SUPPLY FAILURE
No raster, no sound Fusible Resistor (R80), Rectifiers (M1, M2)

SWEEP FAILURE
No raster, has sound Rectifier (M3), V8, V10, V11, V12, V13
No vertical deflection V9
Poor vert. linearity or foldover V9
Poor horiz. linearity or foldover V8, V10, V11
Narrow picture V8, V10, V11, M1, M2
Vert. off freq. V9
Horiz. off freq. V8

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, Diode (M4)
No pic, no sound, has snow V201, V202
No pic, has sound, has raster V3, V13
Has pic, no sound V4, V5, V6

SYNC FAILURE
No vert. sync V6, V7, V8
No horiz. sync V6, V7, V8, M3
No vert. or horiz. sync V6, V7, V8

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



FOLDER 3

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Connect variable bias to IF AGC line. Adjust bias to obtain response curve which shows no indication of overloading.
Set Contrast fully counterclockwise.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	44.0MC (10MC Swp)	41.25MC 42.25MC 45.75MC	Any non-interfering channel	Vert. Amp. thru 10K to point (A). Low side to chassis. (Across Video Det. load)	A1, A2, A3, A4, A5, & Mixer Plate Coil	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown. Adjust Mixer Plate Coil to control low frequency side of curve, A1 and A2 for high frequency side, A3 to control tilt, A4 to control dip and A5 to place 41.25MC marker in trap notch.

SOUND IF ALIGNMENT

Tune in a strong TV signal and adjust A6 for maximum undistorted sound. If two peaks occur, connect the DC probe of VTVM to point (B), and common to chassis.
Adjust to the peak that produces the highest deflection on the VTVM.
Reduce the signal strength (disconnect the antenna or connect an attenuator in series with the antenna) until noise is heard in the sound.
Adjust A7 and A8 for maximum undistorted sound.
Reduce the signal strength even further and retouch A7 and A8 for maximum undistorted sound.
If necessary, repeat the above procedure.

4.5MC TRAP ALIGNMENT

Tune in a TV signal and adjust Fine Tuning until a 4.5MC beat pattern is visible in the picture. Adjust A9 until the horizontal scanning lines are smooth and continuous.

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGES 6 & 8

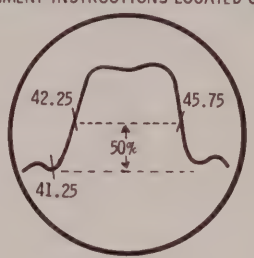
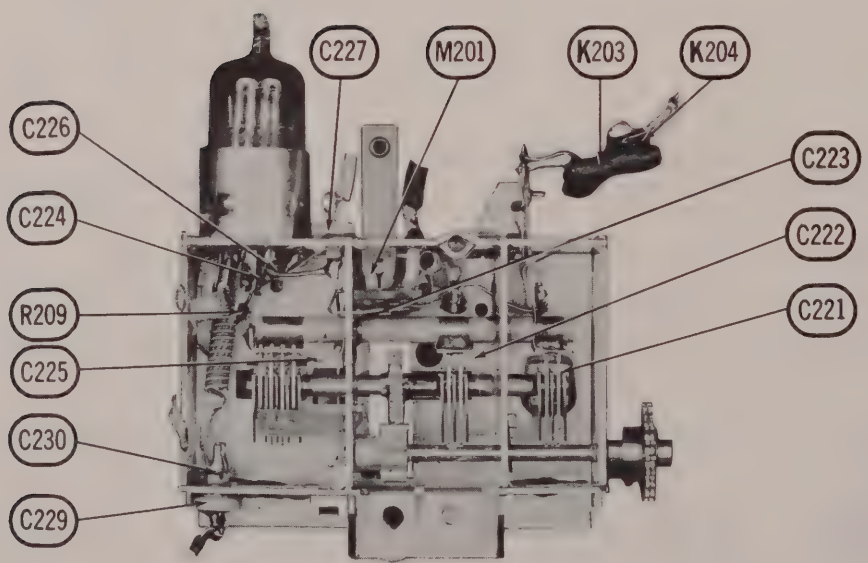
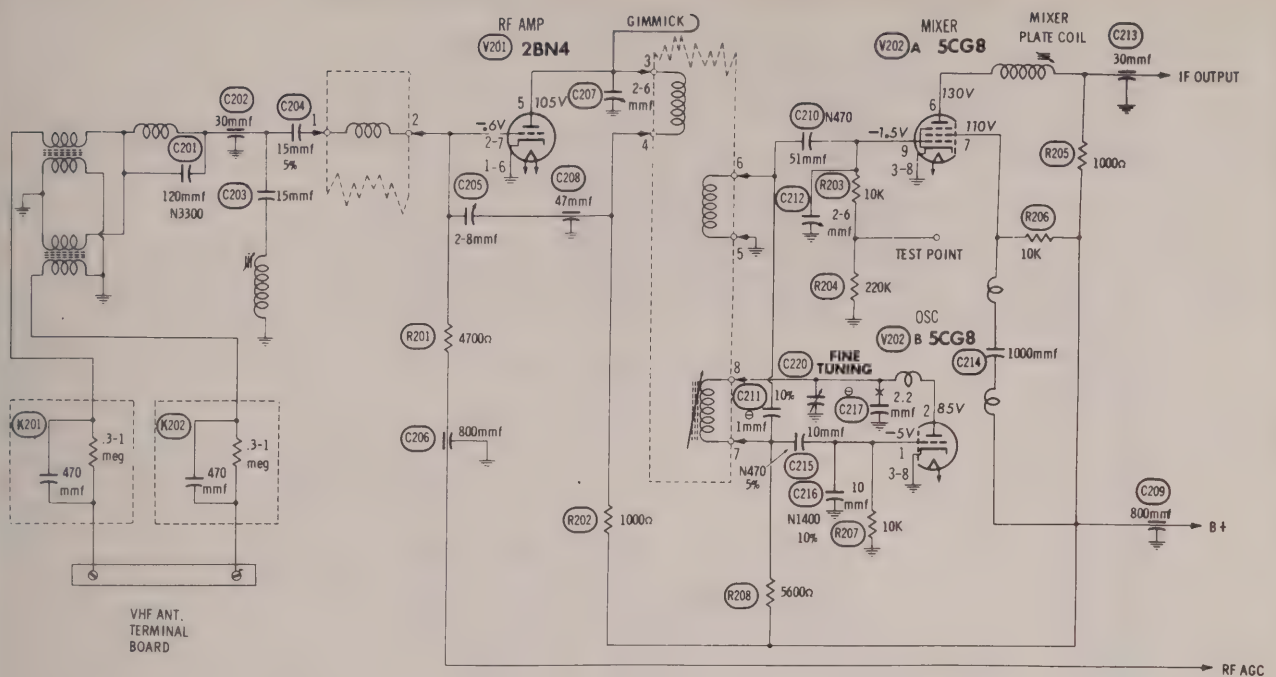


FIG. 1



TUNER TA-42 – SIDE VIEW

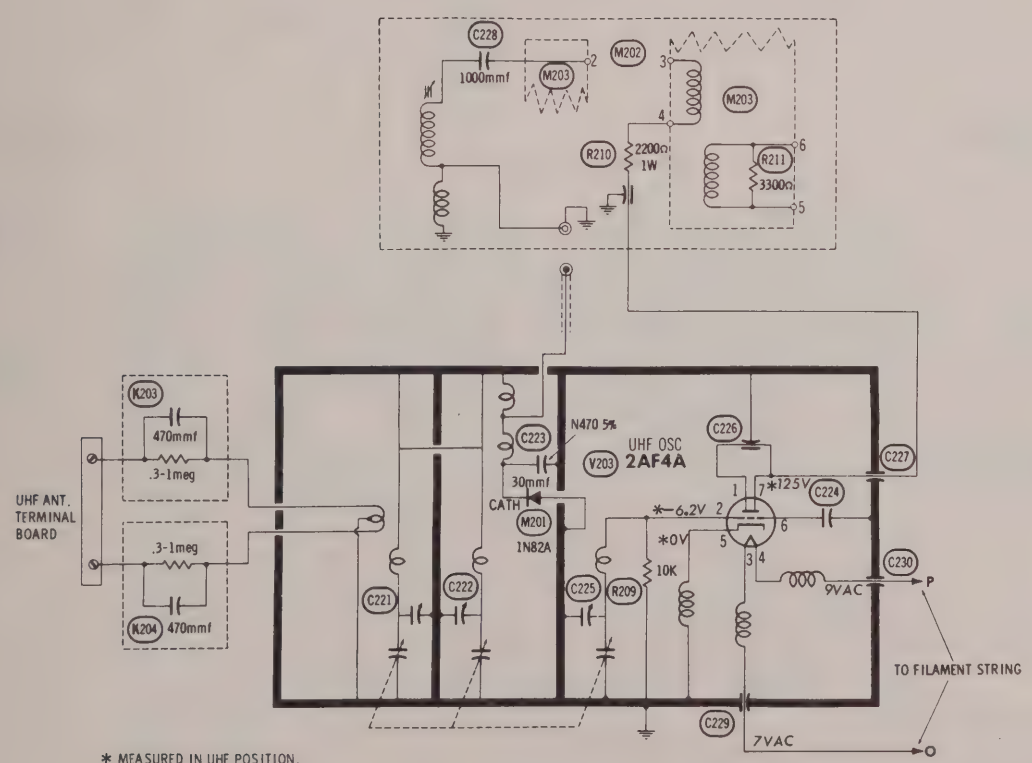


Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1958

VHF TUNER #TA-40, -43, -44



* MEASURED IN UHF POSITION.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1958

REAR COVER #FCN-042 & UHF TUNER #TA-42

TUNER PARTS LIST AND DESCRIPTIONS

TA-40-43-44

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amp.	2BN4	
V202	Mixer-Osc.	5CG8	

ITEM No.	USE	TYPE	NOTES
V203	UHF Osc.	2AF4A	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	TRAV-LER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	120								N3300
C202	30								
C203	15			DI 15	DD-150	L10T15	UC-5415	5GA-Q15	
C204	15				DTZ-15				5%
C205	2-8								
C206	800								
C207	2-6								
C208	47								
C209	800								
C210	51								N470
C211	1								10% ①
C212	2-6								
C213	30								
C214	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C215	10								N470 5%
C216	10								N1400 10%
C217	2.2				DTZ-2R2	CTA6V22C		5TCCB-V22	
C218	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	②
C219	800								
C220									
C221									
C222									
C223	30								
C224									N470 5%
C225									
C226									
C227									
C228	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C229									
C230									

① Some versions may use 1.5mmf in this application.
② Not used in some versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R201	4700Ω			
R202	1000Ω			
R203	10K			
R204	220K			
R205	1000Ω			
R206	10K			

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R207	10K			
R208	5600Ω			
R209	10K			
R210	2200Ω	1		
R211	3300Ω			

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	TRAV-LER PART No.	REPLACEMENT DATA	
K201	Ant. Filter (VHF)	470mmf, .3-1meg		Centralab	RC-471
				Sprague	R-9177
K202	Ant. Filter (VHF)	470mmf, .3-1meg		Centralab	RC-471
				Sprague	R-9177
K203	Ant. Filter (UHF)	470mmf, .3-1meg		Centralab	RC-471
				Sprague	R-9177
K204	Ant. Filter (UHF)	470mmf, .3-1meg		Centralab	RC-471
				Sprague	R-9177

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		TRAV-LER PART No.	CBS PART No.	SYLVANIA PART No.	
M201	1N82A		1N82A	1N82A	UHF Mixer (Clip-in)

MISCELLANEOUS

ITEM No.	PART NAME	TRAV-LER PART No.	NOTES
M202	Cover	FCN-042	UHF
M203	Contacts	23A-148	Extension (For UHF position)

TUNER ALIGNMENT INSTRUCTIONS

VHF OSCILLATOR ALIGNMENT

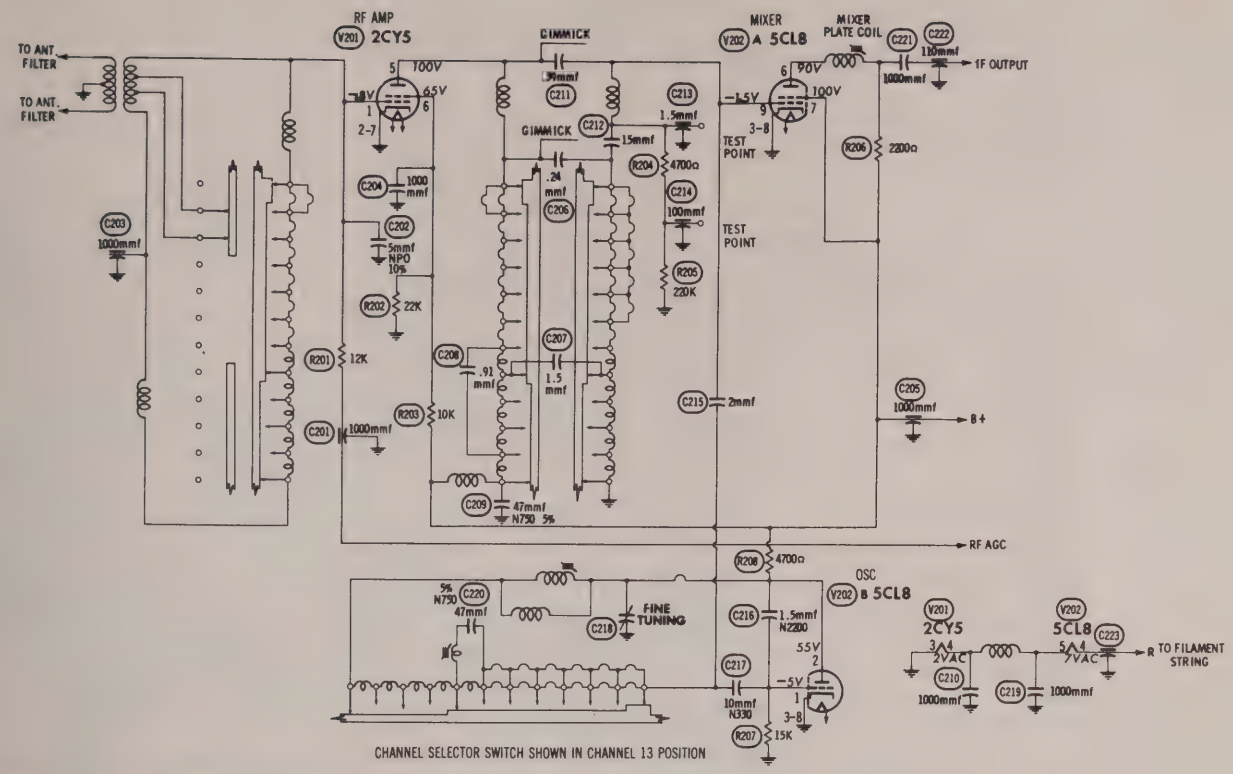
Touch-up adjustment of the VHF Oscillator is possible by removing the rear cover, and supplying power to the receiver. Set the Fine Tuning at the center of its range. The adjustments are accessible, one at a time, thru a hole in the right side of the tuner rear cover as viewed from the rear. Adjust for best picture and sound.

VHF RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

UHF TUNER ALIGNMENT

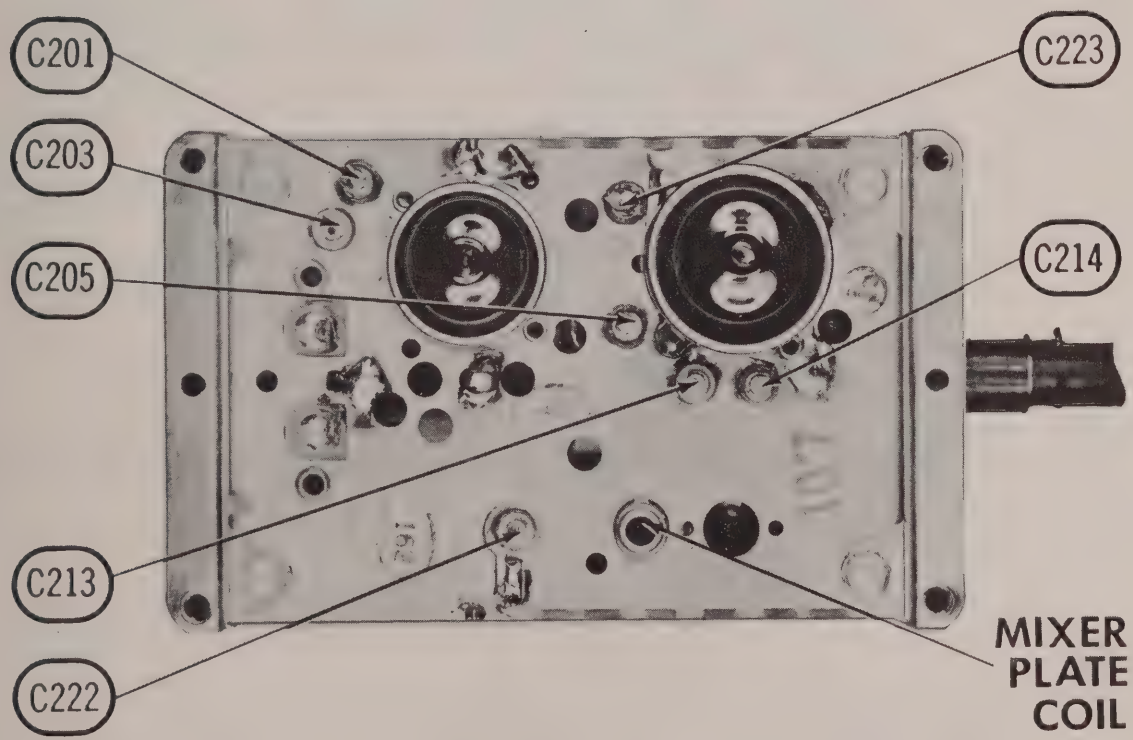
This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.



A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1958

TUNER #TA-75



TUNER #TA-75-TOP VIEW

TUNER #TA-75 PARTS LIST & DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amp.	2CY5	

ITEM No.	USE	TYPE	NOTES
V202	Mixer-Osc.	5CL8	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	TRAV-LER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	1000			EF-001	MFT-1000			503C-D1	
C202	5			NPO-DI 5	DTZ-4R7	C10V5C	ZT-555	5TCCB-V5	NPO 10%
C203	1000			EF-001	MFT-1000			503C-D1	
C204	1000			EF-001	MFT-1000			503C-D1	
C205	1000			EF-001	MFT-1000			503C-D1	
C206	.24								
C207	1.5			NPO-SI 1.5	TCZ-1R5	CTA6V15C	ZT-5515	5TCCB-V15	
C208	.91								
C209	47			N750-DI 47	DTN-47	C10Q47U		5TCU-Q47	N750 5%
C210	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C211	.39								
C212	15			BPD-000015	DD-150	L10Q15	UC-5415	5GA-Q15	
C213	1.5								
C214	100			EF-0001	MFT-100			503C-T1	
C215	2								
C216	1.5								N2200
C217	10								N330
C218									
C219	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C220	47				DTN-47				N750 5%
C221	1000			BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C222	110								
C223									

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R201	12K			
R202	22K			
R203	10K			
R204	4700Ω			

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R205	220K			
R206	2200Ω			
R207	15K			
R208	4700Ω			

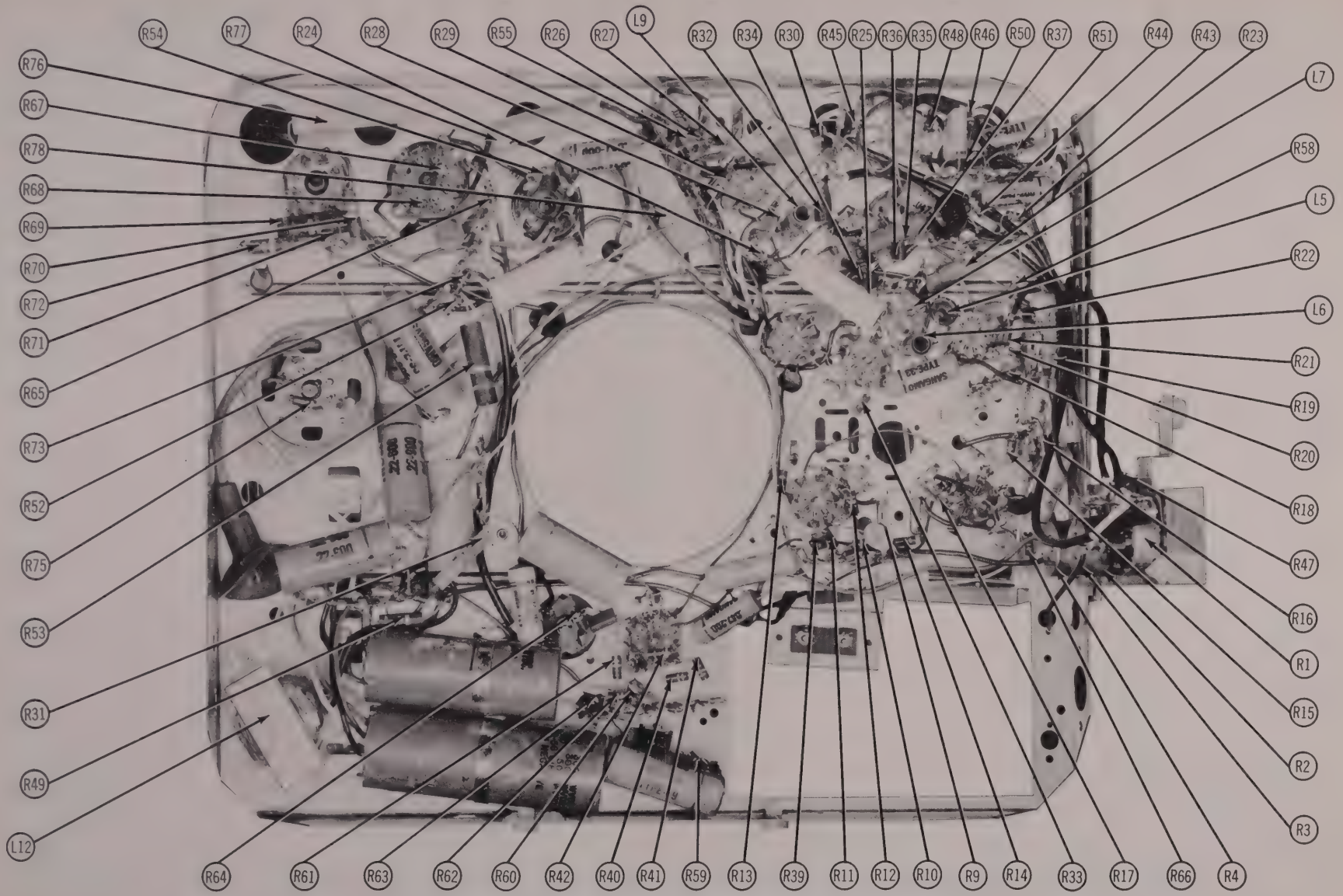
TUNER #TA-75 ALIGNMENT INSTRUCTIONS

OSCILLATOR ALIGNMENT FOR TUNER #TA-75

Set the Fine Tuning at the center of its range. One slug for HIGH band adjustment is located at 4 o'clock, and should be adjusted first. The LOW band adjustment is located at 9 o'clock. Adjust for best picture and sound.

RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	1st Video IF Amp.	3BZ6	
V2	2nd Video IF Amp.	3BZ6	
V3	Video Output	12BY7A	
V4	Sound IF Amp	3AU6	
V5	Audio Det.	3DT6	
V6	Audio Output-Sync Sep.	6AW8A	
V7	1st Sync Amp.	3BA6	
V8	2nd Sync Amp.- Horiz. Osc	6CG7	
V9	Vert. Mult-Vert. Output	6CM7	
V10	Horiz. Output	12DQ6A	
V11	Damper	12AX4GTA	
V12	HV Rectifier	1B3GT	

PICTURE TUBE

ITEM No.	REPLACEMENT DATA				NOTES
	TRAV-LER PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	SYLVANIA PART No.	
V13	17BJP4 17CFP4 21CBP4A		17BJP4 ① 17CFP4 ② 21CBP4 ③ 21CBP4A ④	17BJP4 ② 17CFP4 ②	① "Silverama" ④ ② "Silver Screen 85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA							
	CAP	VOLT	TRAV-LER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.	
C1	200	150	EC-54	PR3-200	BR20015	WS342	TD-200-150	S-110	TVA-1423	
C2	140	300	EC-55	PR1-100	BRRD3334	WS427	TD-150-300	S-200	TVA-1575	
C3A	100	300	EC-56	PR3-047	30044	WT430		Q-01	R2340 *	
B	60	300			BR10005			MT-05100		
C	100	50								
C4	10	300	EC-57	PRS350V10	BR1045	TC62	TD-10-450	MT-4510	TVA-1604	
C5	10	300	EC-57	PRS350V10	BR1045	TC62	TD-10-450	MT-4510	TVA-1604	

* Non-catalog item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	TRAV-LER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	68			SI 68	DS-680	LT9Q68 1RSD5	UC-5468 MC5468	5GA-Q68 MS-515	10%
C7	1000			BPD-001	DD-102	BYA5DI 1RST38	DC531	5HK-DI MS-339	① 5%
C8	1000			BPD-001	DD-102	BYA5DI	DC531	5HE-DI	
C9	390			BPD-001	DD-102	BYA5DI	DC531	5HE-DI	②
C10	1000		CC-67			1RST56		MS-356	5%
C11	1000			BPD-001	DD-102	BYA5DI	DC531	5HK-DI	
C12	.1	200		P288N-1	DF-104	CUB32P1	GEM-3I1	2TM-P1	
C13	4.7			NPO-SI 4.7	TCZ-4R7	CTA8V47C	ZT-5547	5TCCB-V47	
C14	4.7			NPO-SI 4.7	TCZ-4R7	CTA8V47C	ZT-5547	5TCCB-V47	②
C15	.047	200		P288N-047	DF-503	CUB2B47	GEM-4147	2TM-S47	
C16	180			SI 100	DS-101	LT6T1	UC-531	5GA-T1	
C17	22			SI 22	DS-220	LT9Q22	UC-5422	5GA-Q22	
C18	.1	400		P488N-1	DF-104	CUB4P1	GEM-4I1	4TM-P1	
C19	4.7			NPO-SI 4.7	TCZ-4R7	CTA8V47C	ZT-5547	5TCCB-V47	
C20	68			SI 68	DS-680	LT9Q68	UC-5468	5GA-Q68	
C21	5000			BPD-005	DD-502	BYA10D5	DC535	5HK-D5	
C22	.022	200		P288N-022	DD-303	CUB4S22	GEM-4I22	2TM-S22	
C23	5000			BPD-005	DD-502	BYA10D5	DC535	5HK-D5	
C24	5000			BPD-005	DD-502	BYA10D5	DC535	5HK-D5	
C25	1000			BPD-001	DD-102	BYA5DI	DC531	5HK-DI	③
C26	1000			BPD-001	DD-102	BYA5DI	DC531	5HK-DI	
C27	10000			BPD-01	DD-103	BYA6DI	DC5I1	5HK-6I	
C28	3300			1467-0022	D6-232	1W5D22	UC-5222	1FM-222	
C29	.047	200		P288N-047	DF-503	CUB2B47	GEM-4147	2TM-S47	
C30	.047	200	CC-66	HVD-30-1000	DD90-302	HVB20I	DC3021	30GA-DI	
C31	.047			P288N-047	DF-503	CUB2B47	GEM-4147	2TM-S47	
C32	.1	200		P288N-1	DF-104	CUB2P1	GEM-2I1	2TM-P1	
C33	.047	200		P288N-047	DF-503	CUB2B47	GEM-2I47	2TM-S47	
C34	4700			BPD-0047	DD-472	BYA10D47	UC-5247	5GA-D47	
C35	10000			BPD-01	DD-103	BYA6DI	DC5I1	5HK-6I	
C36	3300			1467-0022	D6-232	1W5D22	UC-5222	1FM-222	
C37	.047	200		P288N-047	DF-503	CUB2B47	GEM-4147	2TM-S47	
C38	.047	200		P288N-047	DF-503	CUB2B47	GEM-4147	2TM-S47	
C39	3000	2000	CC-68	HVD-30-1000	DD90-302	HVB20I	DC3021	30GA-DI	
C40	.047			P288N-047	DF-503	CUB2B47	GEM-4147	2TM-S47	
C41	.047	600		P688N-047	DF-503	CUB6B47	GEM-6147	6TM-S47	
C42	.22	600		P688N-22		CUB6P22	GEM-6022	6TM-P22	
C43	.02	600		P668N-02	DD-303	CUB6S2	GEM-6I2	6TM-S2	
C44	.047	600		P668N-047	DF-503	CUB6B47	GEM-6147	6TM-S47	
C45	1000			BPD-001	DD-102	BYA5DI	DC531	5HK-DI	
C46	1000			BPD-001	DD-102	BYA5DI	DC531	5HK-DI	
C47	.022	400		P488N-022	DD-303	CUB4S22	GEM-4I22	4TM-S22	
C48	.5	350		P288N-5		CUB2P5	GEM-306	2TM-P5	
C49	390		MC-22	1468-00027	D6-271	1R5T27		MS-327	10%
C50	.01	600	PC-22				GEM-1611		10%
C51	1000			1467-001	D6-102	1W5DI	MC355	1FM-21	
C52	5000			BPD-005	DD-502	BYA10D5	DC535	5HK-D5	
C53	.047	400		P488N-047	DF-503	CUB4B47	GEM-4147	4TM-S47	
C54	.22	600		P668N-22		CUB6P22	GEM-6022	6TM-P22	
C55	1000	1500	CC-53	HVD-15-1000	DD30-152	HVB16I	DC3021		
C56	.22	600		P668N-22		CUB6P22	GEM-6022	6TM-P22	
C57	.1	400		P488N-1	DF-104	CUB4P1	GEM-4I1	4TM-P1	
C58	4700			1467-0047	D6-472	1W5D47	UC-5247	1FM-247	
C59	1000			BPD-001	DD-102	BYA5DI	DC531	5HK-DI	
C60	1000			BPD-001	DD-102	BYA5DI	DC531	5HK-DI	
C61	82	1500	PC-33C	P1588N-01	DD16-103	CUB16I	GEM-1611	1GTM-S1	
C62	05	600		P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	

① Some versions may use 560mmf 5% in this application (Part #CC-47).
② Not used in some versions
③ Some versions may use .1mfd in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	TRAV-LER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	500K	½	VC-120				PP-55A	Volume & Switch (Push-Pull)
R2A	1000Ω	½	VC-83	B-505		B17-208	U3	Picture Contrast
B	Shaft			Not Req.		S1G	Not Req.	
R3A	200K	½	VC-132	B-46	A47-200K-S	Q11-129	TA254L	Vert. Hold
B	Shaft			Not Req.	[illegible]-3	Not Req.	Not Req.	
R4A	50K	½	VC-83	B-31	A47-50K-S	Q11-123	TA54L	Horiz. Hold
B	Shaft			Not Req.	K58-3	Not Req.	Not Req.	
R5A	100K	½	VC-84	AB-40	A47-100K-S	Q11-128	PTA15L	Brightness, Note 1
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R6A	3meg	½	VC-131	AB-84	A47-3meg-S	Q11-140	PTA355L	AGC
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R7A	5000Ω	½	VC-85	AB-10	A47-5000-S	Q11-114	SU-14	Vert. Lin.
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R8A	2.5meg	½	VC-78	AB-83	A47-2.5meg-S	Q11-239	SU-565	Vert. Size
B	Shaft			AK-19	RN-3	TQ	Not Req.	

Note 1. Alternate Part #VC-109 may be used in some versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		TRAV-LER PART No	NOTES
	OHMS	WATT		
R9	330Ω			
R10	100K			
R11	100K			
R12	330Ω			
R13	56Ω			Note 1
R14	12000Ω			
R15	33K			
R16	1500Ω			
R17	180Ω			
R18	6800Ω			
R19	1meg			
R20	3.9meg			
R21	1meg			
R22	56Ω			
R23	6800Ω	5	WR-8	
R24	100K			
R25	560Ω			
R26	560K			
R27	470Ω			
R28	680Ω			
R29	270K			
R30	100K			
R31	33K	1		
R32	220Ω			
R33	1.5meg			
R34	27K			
R35	12K	5	WR-37	
R36	2.2meg			
R37	3.3meg			
R38	330K			
R39	150K			
R40	22K			
R41	560K			
R42	4700Ω			
R43	15K			
R44	15K			
R45	220K			

ITEM No.	RATING		TRAV-LER PART No.	NOTES
	OHMS	WATT		
R46	220K			
R47	47K			
R48	1meg			
R49	820Ω	1		
R50	820K			
R51	15K			
R52	470K			
R53	2700Ω	2		
R54	330Ω			
R55	22K			
R56	680Ω			
R57	680Ω			
R58	4700Ω			
R59	22K			
R60	120K			
R61	110K 5%		IR-147	
R62	56K			
R63	10K			
R64	22K			
R65	33K			
R66	33K			
R67	220K			
R68	47Ω			
R69	8200Ω	2		
R70	150K	1		
R71	150K	1		
R72	150K	1		
R73	56K			
R74	5600Ω	1		
R75	2.2Ω			
R76	27Ω	10	WR-26	
R77	27Ω	10	WR-26	
R78	2100Ω	10	WR-28	
R79	100Ω		F-9	
R80	5.6Ω		F-6-1	
R81	220K			
R82	470K			

Note 1. Some versions may use 150Ω in this application.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		TRAV-LER PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	1st. Video IF	L-83	17-4534	TV-131		VF-4	
L2	2nd. Video IF	L-103					Includes 41.25MC Trap
L3	3rd. Video IF						
L4	RF Choke						7 Microhenries
L5	Series Peaking Coil	L-66A	19-3500 *	TV-188 *	6138 *	VP-8 *	478 Microhenries, wound on 12K resistor
L6	4.5MC Trap	L-89	20-1004	TV-181	1469 ▲	SF-3	
L7	Shunt Peaking Coil	L-88	19-5100 ■		6157 ●		1075 Microhenries, wound on 4700Ω resistor
L8	1st. Sound IF	L-90	17-3400	TV-161	1469 ▲	SF-3	
L9	2nd. Sound IF	L-80A		TV-149			
L10	Quadrature Coil	L-110			1461 ●	SD-5 ●	Includes Cap. & resistor

* Parallel with 12K resistor. ● Parallel with 4700Ω resistor. ▲ Parallel with 180K resistor.
▲ Disregard tap. ■ Parallel with 8200Ω resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA						NOTES
	PRI.	SEC.	TRAV-LER PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	
L11	75Ω *		L-119A						* Tapped @ 52Ω Waveform Coil - 45Ω

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L12	.210A	49Ω	1 Hy.	FC-5	C5037 ①	C-3974 ①	F-803 ①	C-3326 ①	26C41	C-24X

① Drill new mounting hole.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	TRAV-LER PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	SPK-49 ①	4A07	① Used in Models 1722, 1723, U, 1724, 17MT65
	5"	PM	3-4Ω	SPK-36 ②	5A07	② Used in Models 721-MT-600, 721-K-610
	6"			SPK-82 ③		③ Used in Models 721-LP-650

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA							NOTES
		TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	Vert. Output	TR-25A	Z1806 ①	A-3039 ①	V313 ①	A-8141 ①	26854 ①	A-114X	
T2 A	Yoke-Horiz. (21MH)	L-81A	DF807	MDF-92	Y80P19/43	DY-16A	Y-16	Y-41 &	
B	(90°)-Vert. (40MH)		②③	②③	②③	②①	②①	NW8 ②	
	RearCover & Centering Device	MP-77						YC-1 & CL-1	
T3	Horiz. Output	TR-24						D-129 *	

① Disconnect yoke socket pin #3 from ground. Connect blue lead to plate of V9, red lead to yoke socket pin #4, green lead to yoke socket pin #3 and junction of C5 and R35. Drill new mounting hole(s).
② Use original rear cover and centering device. Rotate core clamp 180 degrees. Mount with leads out top. Connect same as original.
③ Use original yoke damping network, if necessary.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
8						8
7						7
2						2
5						5
1						1

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	TRAV-LER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T4	1800Ω	3-4Ω	AT-18	Z1118	A-2934	AU-608	A-3881	24854	S-51X	

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	TRAV-LER PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.240A	SR-5 ①	1236AH	1N1007 ②	T300 ① TV500 ③	300 ② M500 ②	① Selenium Type. ② Germanium Type.
M2	.240A	SR-5 ① SR-10 ①	1236AH K1616 ①	1N1007 ②	T300 ① TV500 ② 1T1 ①	300 ② M500 ③	③ Silicon Type.
M3							

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		TRAV-LER PART No.	CBS PART No.	SYLVANIA PART No.	
M4	1N60	SC-1	1N60	1N295	Video Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	TRAV-LER PART No.	NOTES
M5	Tuner	TA-40	VHF, Models 1723, U
	Tuner	TA-43	VHF, Models 17MT65
	Tuner	TA-75	VHF, Models 721-K-610, 721-LP-650, 721-MT-600, 1722, 1724
	Tuner	TA-42	UHF, Model 1723U
	Tuner Cover	FCN-042	UHF Provision for Tuner TA-40 to use In Model 1723U

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	DW-65T	Models 1722, 1723, U, 1724
Safety Glass	DW-80	Models 721-K-610, 721-LP-650, 721-MT-600
Mask	MP-103	Includes Safety Glass, Model 17MT65
Mask	MP-96	Models 721-K-610, 721-LP-650, 721-MT-600
Bezel	DW-79	Model 721-MT-600
Knob	K-200	VHF Channel Selector, Models 1722, 1724
Knob	K-247	VHF Channel Selector, Models 1723, U
Knob	K-269	VHF Channel Selector, Model 17MT65
Knob	K-237	VHF Channel Selector, Models 721-K-610, 721-LP-650, 721-MT-600
Knob	K-201	VHF Finé Tuning, Models 1722, 1724
Knob	K-248	VHF Fine Tuning, Models 1723, U
Knob	K-266	VHF Fine Tuning, Model 17MT65
Knob	K-238	VHF Fine Tuning, Models 721-K-610, 721-LP-650, 721-MT-600
Knob	K-269	UHF Fine Tuning, Model 1723U
Knob	K-270	UHF Channel Selector, Model 1723U
Knob	K-239	S Used, Models 721-K-610, 721-LP-650, 721-MT-600
Knob	K-246	4 Used, Models 1722, 1723, U, 1724
Knob	K-254	4 Used, Model 17MT65
Leg	CH-68A	Model 721-K-610
Leg	CH-69A	Model 721-LP-650

WIRING DATA

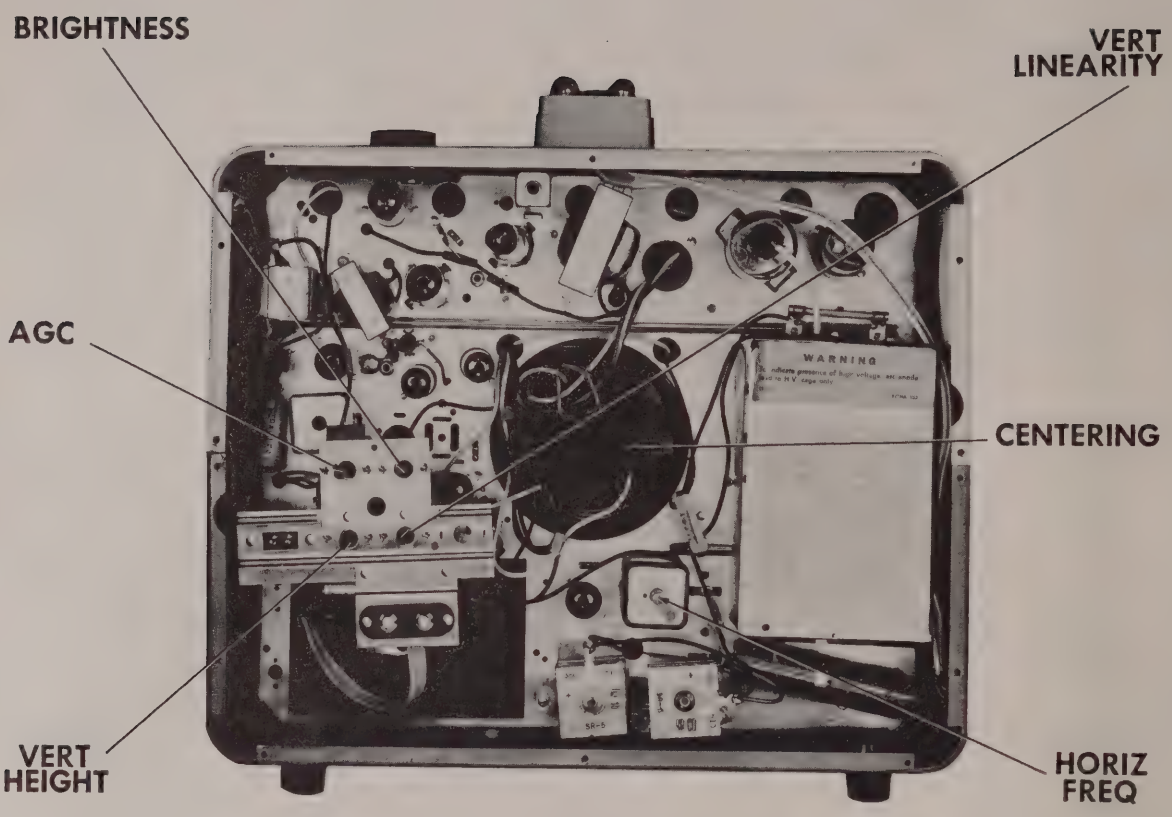
High Voltage Lead	Use BELDEN No. HKHH
Shielded Hook-up Wire	Use BELDEN No. 8886 (Single Conductor) 8736 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8484 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

TRAV-LER MODELS 17MT65, 721-K-610, 721-LP-650, 721-MT-600, 1722, 1723, U, 1724 (Ch. 740-78, 743-48, 775-88)

FOLDER 3

MIXER PLATE COIL
C201
C206
C213
C202
K201
M203
K202
C209
C219
R201
C204
C203
C205
C208
C207
R203
R204
C212
R202
R206
C216
C214
R205
R208
C215
C211
R207
C210
C217
C220
C218

TA-75



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern.

Adjust for normal picture and sound. Set the Horizontal Hold at the center of its range.

Adjust Horizontal Frequency slug (B1) until the picture synchronizes horizontally.

Connect the vertical amplifier of a scope thru a 10mmf capacitor to point Ⓒ. Low side to chassis.

Adjust Horizontal Waveform slug (B2) for waveform similar to Fig. 2 with the broad peaks 5% lower than narrow peaks. While making this adjustment, keep picture synchronized horizontally with B1.

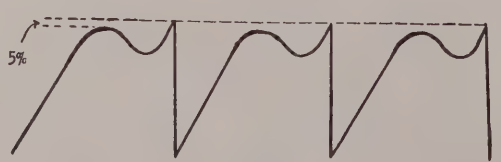
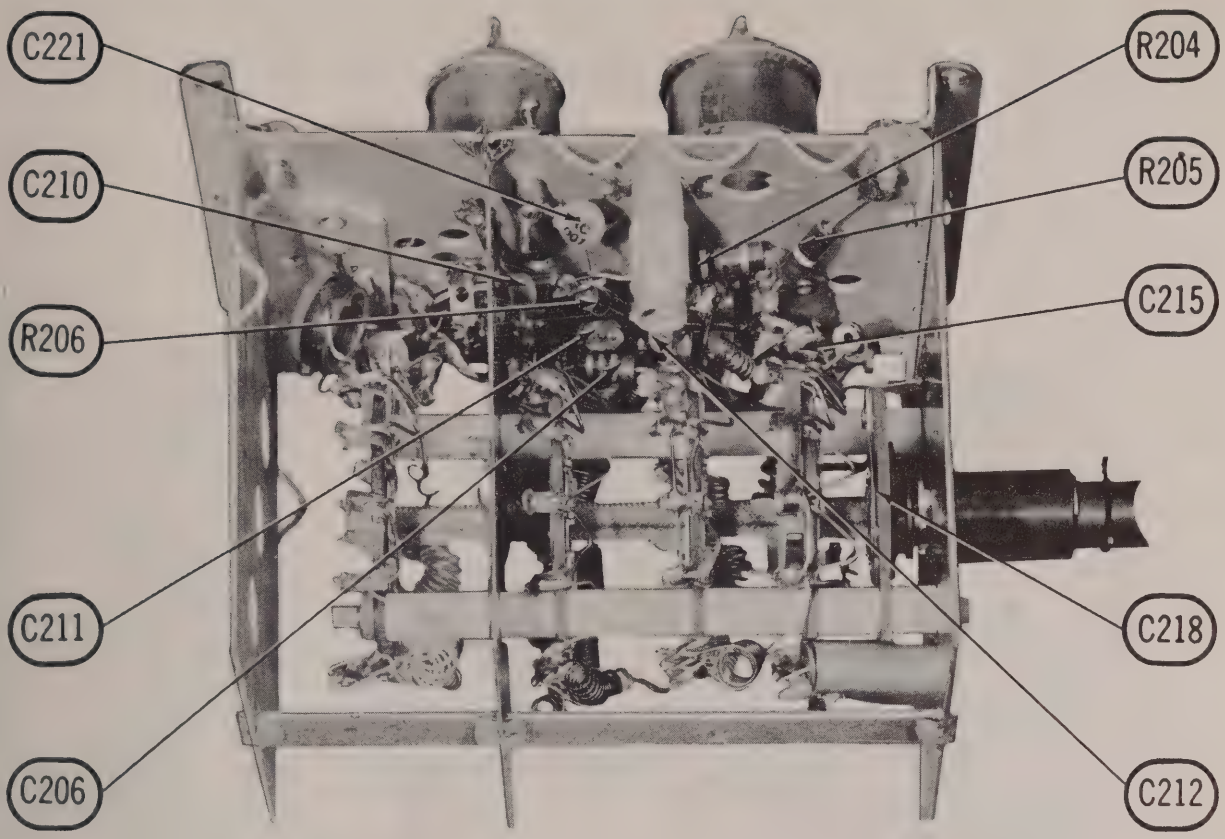
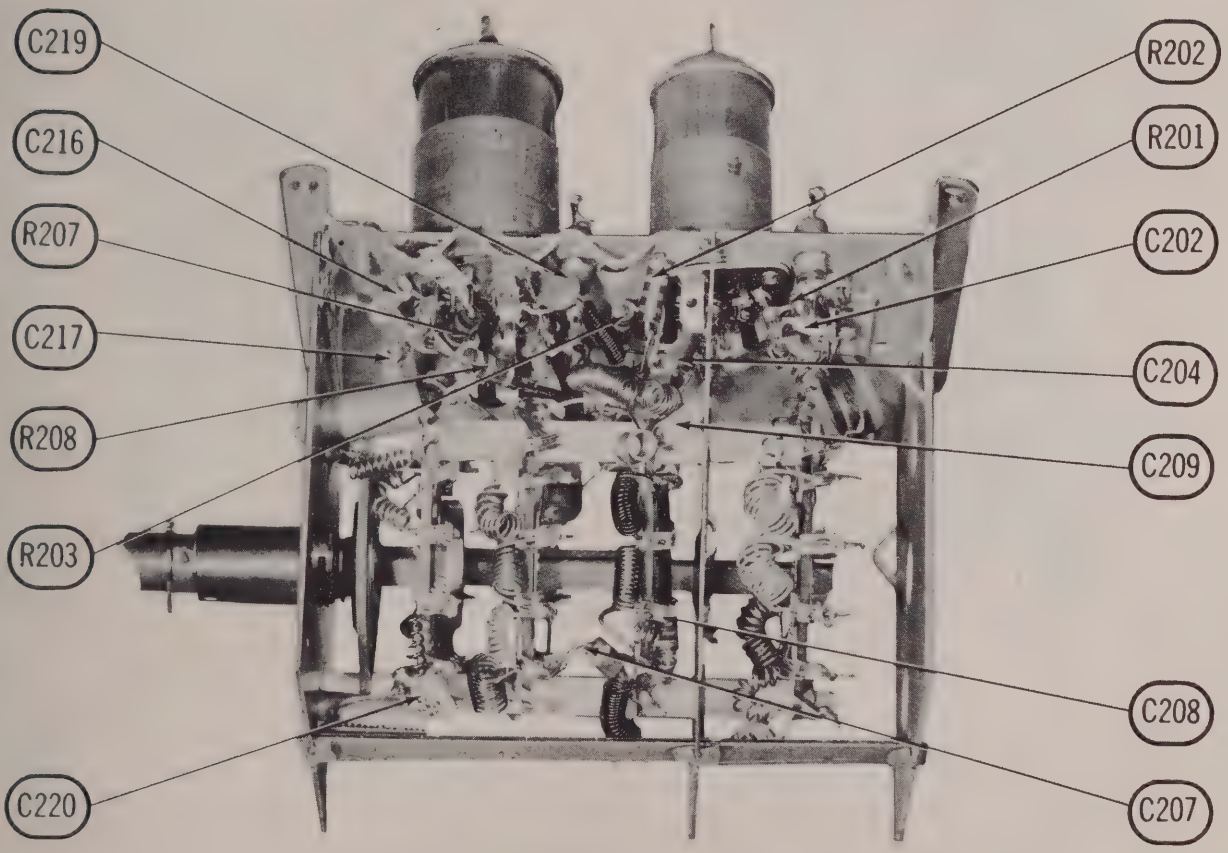


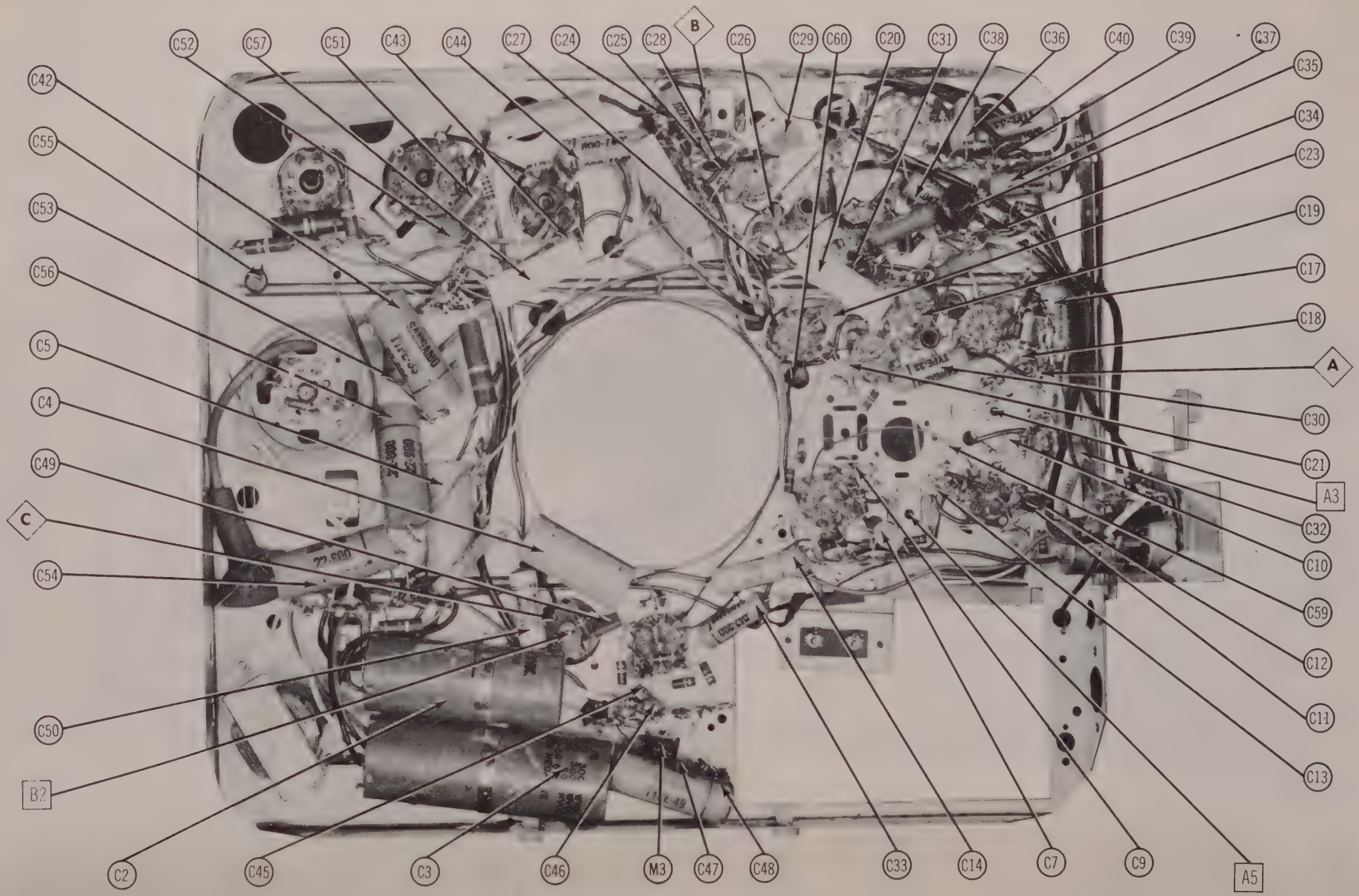
FIG. 2



TUNER #TA-75-LEFT SIDE



TUNER #TA-75-RIGHT SIDE



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

CHASSIS TOP VIEW

RESISTANCE MEASUREMENTS

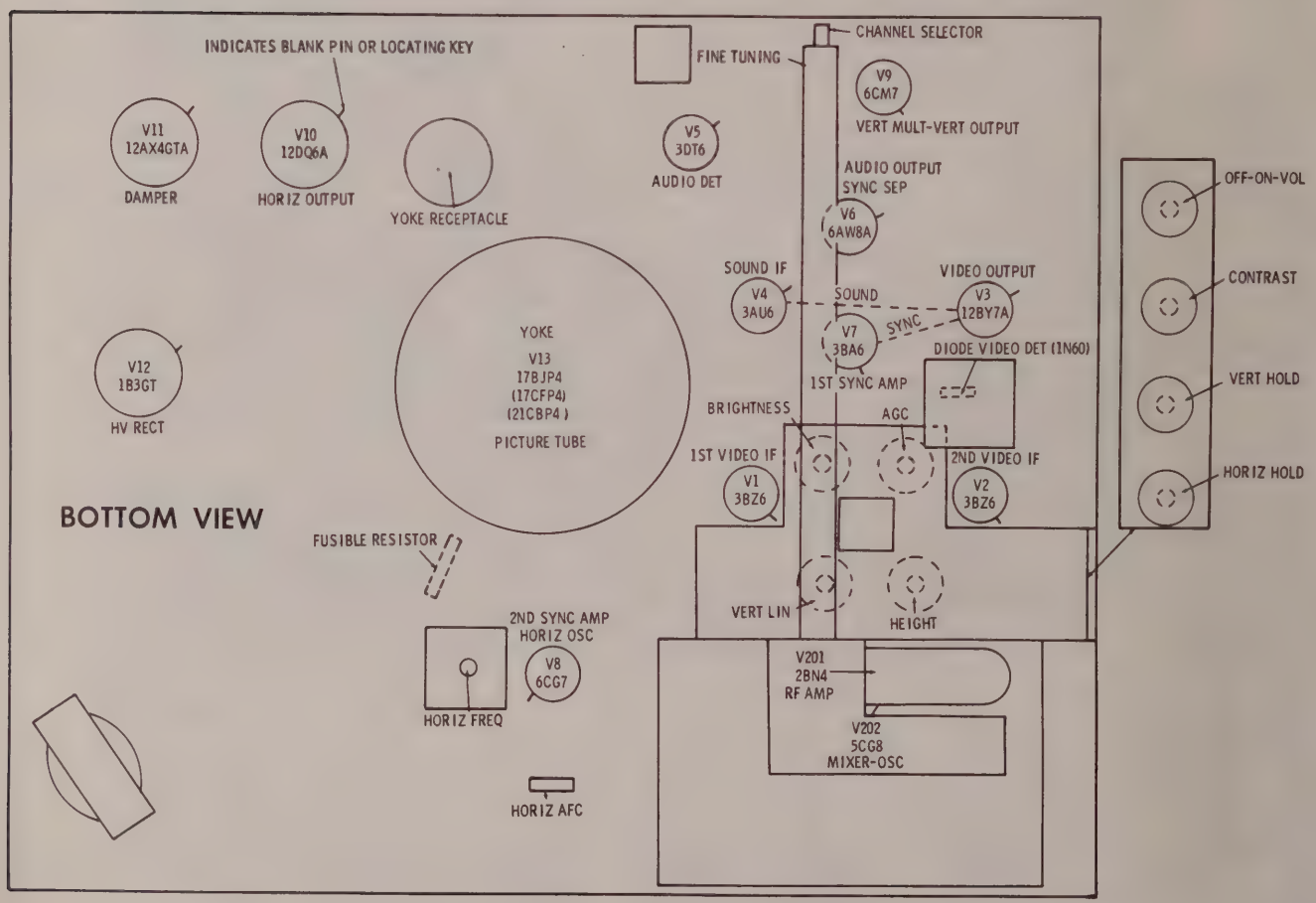
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BZ6	630K	56Ω	7.5Ω	8.5Ω	†2400Ω	†2400Ω	0Ω		
V2	3BZ6	.2Ω	180Ω	9.5Ω	8.5Ω	†1500Ω	†34K	0Ω		
V3	12BY7A	•90Ω	750K	0Ω	5Ω	5Ω	6.5Ω	†6800Ω	†2100Ω	NC
V4	3AU6	1Ω	0Ω	7Ω	6.5Ω	†54Ω	†2100Ω	560Ω		
V5	3DT6	5.6Ω	680Ω	3.5Ω	3Ω	†270K	†2600Ω	560K		
V6	6AW8A	0Ω	1.5meg	†150K	5Ω	3.5Ω	220Ω	0Ω	†33K	†520Ω
V7	3BA6	1.3meg	0Ω	7.5Ω	7Ω	†12K	†2100Ω	0Ω		
V8	6CG7	•†45K	190K	0Ω	10.5Ω	9.5Ω	†11K	20K	0Ω	0Ω
V9	6CM7	†4600Ω	NC	•130K	11.5Ω	10.5Ω	•†2.8meg	220K	1meg	•1000Ω
V10	12DQ6A	TP	39Ω	TP	†8200Ω	220K	NC	42Ω	0Ω	TOP CAP †16Ω
V11	12AX4GTA	NC	NC	¶300K	NC	†49Ω	NC	69Ω	72Ω	
V12	1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP †231Ω
V13	17BJP4	1.5Ω	22K	PIN 6 0Ω	PIN 10 †56K	PIN 11 •115K	PIN 12 3Ω			
V201	2BN4	0Ω	630K	0Ω	.5Ω	†3400Ω	0Ω	630K		
V202	5CG8	10K	†8000Ω	0Ω	1.5Ω	.5Ω	†3400Ω	†12K	0Ω	230K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.

• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.

† MEASURED FROM 270V SOURCE. NC NO CONNECTION.

‡ MEASURED FROM PIN 3 OF V11. TP TIE POINT.



TUBE PLACEMENT CHART

PHOTOFACT* Folder
with CIRCUITRACE*
*TRADE MARK

GENERAL ELECTRIC MODELS P725B, P726B, P750A

GENERAL ELECTRIC MODELS
P725B, P726B, P750A

MODEL P750A

GENERAL ELECTRIC MODELS
P725B, P726B, P750A

TRADE NAME	General Electric Models P725B, P726B, P750A
MANUFACTURER	General Electric Co., Products Service, Radio Receiver Dept., 869 Broad St., Utica, N.Y.
TYPE SET	Battery Operated Portable AM Transistorized Receiver
POWER SUPPLY	4.5 Volts DC
TUNING RANGE—BROADCAST	535-1620KC
RATING	17MA @ 4.5 Volts DC (No Signal, Minimum Volume) 20MA @ 4.5 Volts DC (Signal, Normal Volume).

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

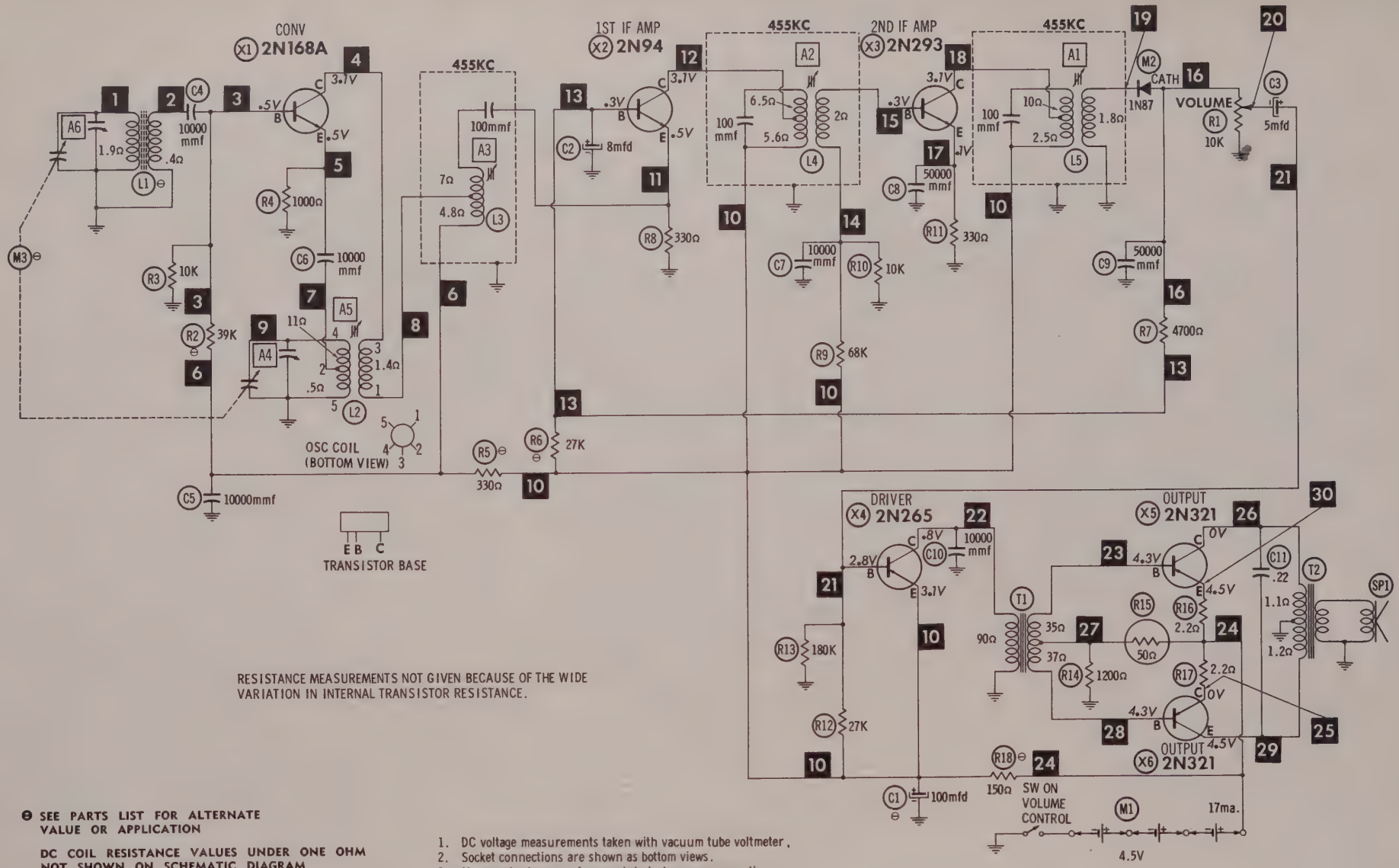
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3	Adjust for maximum output.
2.		Loop	1620KC	"	"	A4	"
3.		"	600KC	600KC	"	A5	Adjust for maximum output while rocking tuning gang. Repeat Steps 2 & 3.
4.		"	1500KC	Tune to 1500KC signal.	"	A6	Adjust for maximum output.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

H657

SET 414 FOLDER 4



Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum. no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE* *TRADE MARK

©Howard W. Sams & Co., Inc. 1958

414-4

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N168A	Converter	CBS-2N439			2N212	NPN Note 1
X2	2N94	1st IF Amplifier	CBS-2N438			2N94	NPN
X3	2N293	2nd IF Amplifier	CBS-2N439			2N216	NPN Note 2
X4	2N265	Driver		2N407	2N362	2N406	PNP
X5	2N321	Output		2N270	2N360	2N321	PNP Note 3
X6	2N321	Output		2N270	2N360	2N321	PNP Note 3

Note 1. Some versions may use type 2N164A in this application.
Note 2. Some versions may use type 2N314 in this application.
Note 3. Some versions may use type 2N241A or 2N270 in this application.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	G. E. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	100	10	①	PRS12V100	BBR100-15	TT15X100	TD-100-15	MTH-1210	TVA-1103
C2	8	10	RCE-225	PWE10008	NL10-10	TT25X8	ML8-15	MQ-1507	R2201*
C3	5	10		XPP-10005	NL5-15	TT12X5	ML5-15	MMT-0505	TE-1127

* Non-Catalog Item.
①Some versions may use a 175mfd@ 6VDC (Part # RS-1458)

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	G. E. PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	10000		RS-1022	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C5	10000		RS-1022	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C6	10000		RS-1022	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C7	10000		RS-1022	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C8	50000		RS-1024	BPD-05				TG-S50	
C9	50000		RS-1024	BPD-05				TG-S50	
C10	10000		RS-1022	BPD-01	DD-103	BYA6S1	DC511	5HK-S1	
C11	.22	100		P288N-22		CUB2P22	GEM-2022	2TM-P22	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	G. E. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	10K	½	RS-1347					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

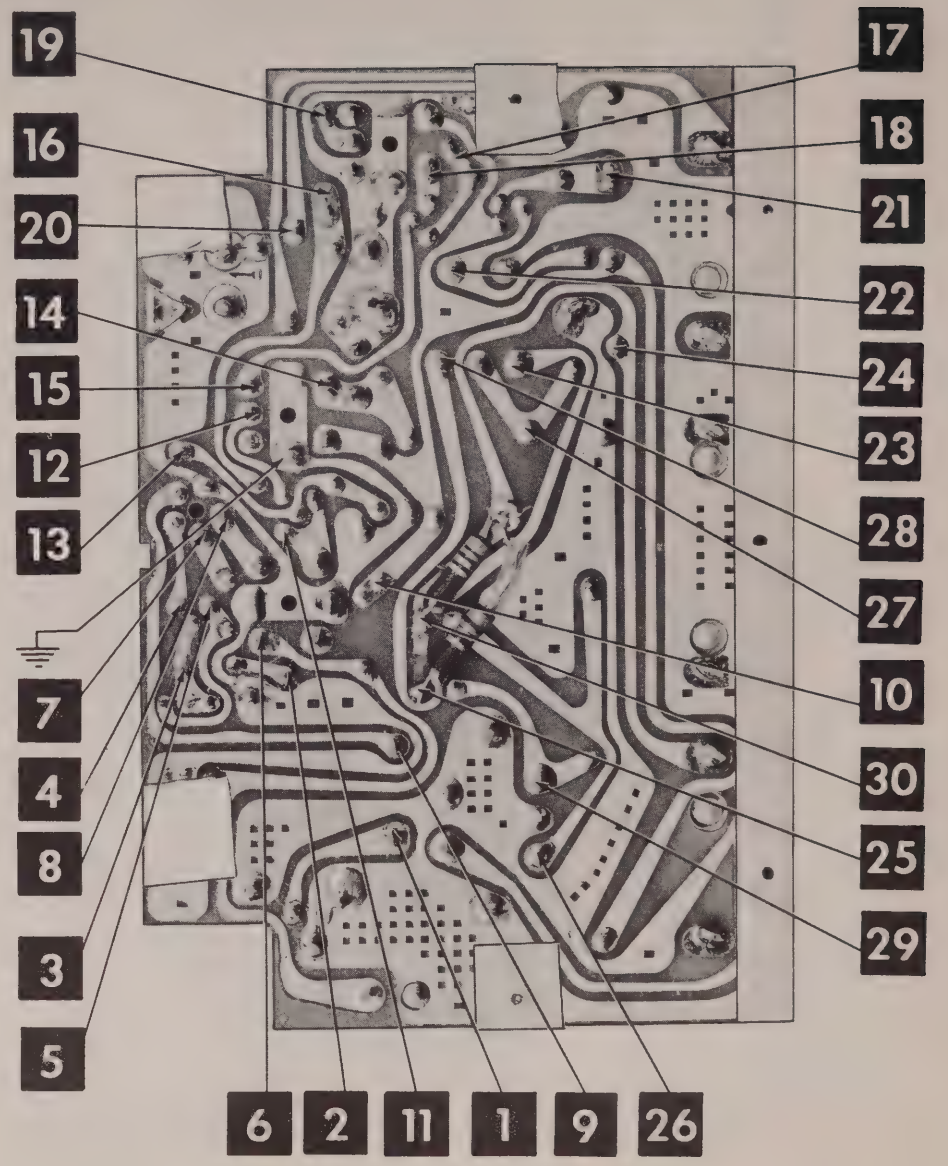
ITEM No.	RATING		G. E. PART No.	NOTES
	OHMS	WATT		
R2	39K			Note 1.
R3	10K			
R4	1000Ω			
R5	330Ω			Note 2.
R6	27K			Note 3.
R7	4700Ω			
R8	330Ω			
R9	68K			
R10	10K			

ITEM No.	RATING		G. E. PART No.	NOTES
	OHMS	WATT		
R11	330Ω			
R12	27K			
R13	180K			
R14	1200Ω			
R15	50Ω		RS-1355	
R16	2.2Ω			
R17	2.2Ω			
R18	150Ω			Note 4.

Note 1. Some versions may use 18K in this application.
Note 2. Some versions may use 1000Ω in this application
Note 3. Some versions may use 33K to 56K in this application.
Note 4. Some versions may use 100Ω in this application.

PRINTED BOARD

A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA G. E. PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Loop Stick	RS-1386					Model P750A
	Loop Stick	RS-1354					Models P725B, P726B
L2	Osc. Coil	RS-1351					Includes 100mmf Cap.
L3	1st IF	RS-1348					
L4	2nd IF	RS-1349					
L5	3rd IF	RS-1350					

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO PRI.	TURNS RATIO SEC.	REPLACEMENT DATA G. E. PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	1.5	:1	RS-1352 (113A6433)				TR-66		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA G. E. PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	140Ω CT	3-4Ω	RS-1553 (113A6434)							

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA G. E. PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	RB-1057 (671C268)	4A1	

BATTERIES

ITEM No.	VOLTAGE	G. E. PART No.	REPLACEMENT DATA BURGESS "A"	BURGESS "B"	EVEREADY "A"	EVEREADY "B"	MALLORY "A"	MALLORY "B"	NOTES
M1	4.5V			2R ①		950 ①		M-13R①	①3 Used.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA G. E. PART No.	CBS PART No.	SYLVANIA PART No.	NOTES
M2	IN87		IN64	IN295	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	G. E. PART No.	NOTES
M3	Tuning Cap	RS-1423	2 Gang, Model P750A
	Tuning Cap	RS-1346	2 Gang, Models P725B, P726B

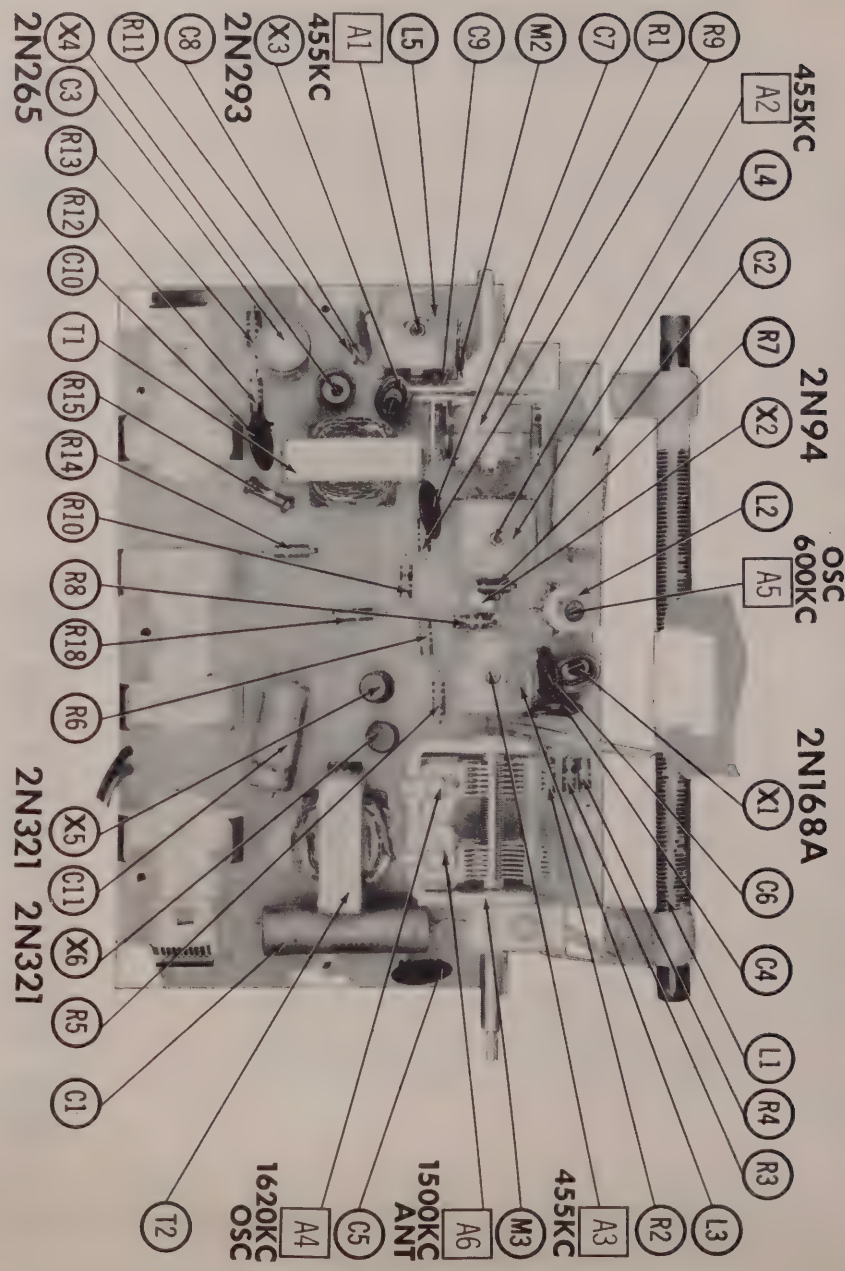
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



PHOTOFACT* Folder with CIRCUITRACE*

HARMAN-KARDON MODEL TA-12

HARMAN-KARDON MODEL TA-12

HARMAN-KARDON MODEL TA-12

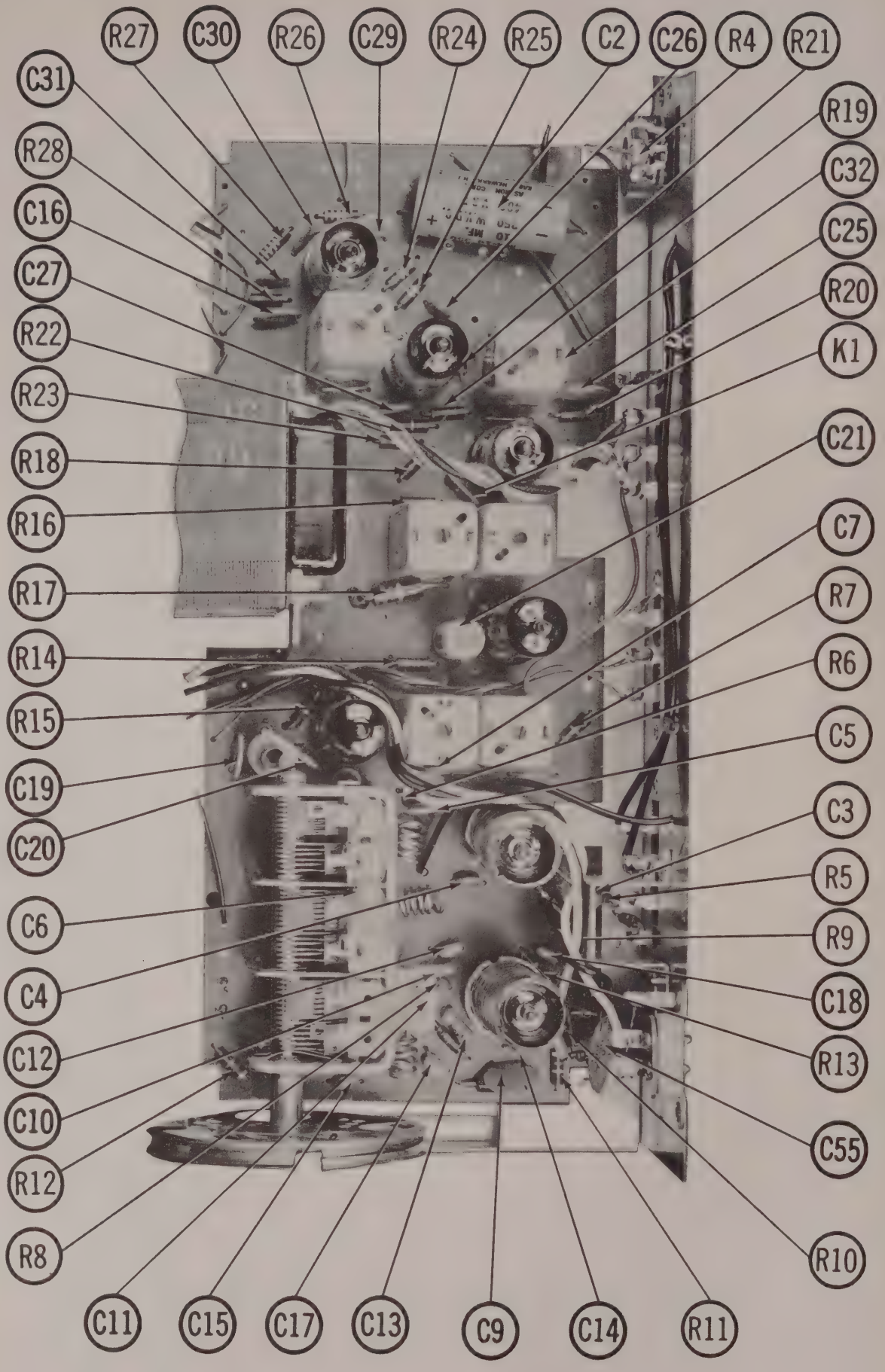
TRADE NAME	Harman-Kardon Model TA-12		
MANUFACTURER	Harman-Kardon Inc., 520 Main St., Westbury, L. L, N. Y.		
TYPE SET	AC Operated FM-AM Receiver		
TUBES	Ten		
POWER SUPPLY	105-125 Volts AC-50/60 Cycles	RATING	.95 Amp. @ 117 Volts AC (93 Watts) FM
TUNING RANGE - BROADCAST	530 - 1650KC	FREQ. MOD.	88 - 108MC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

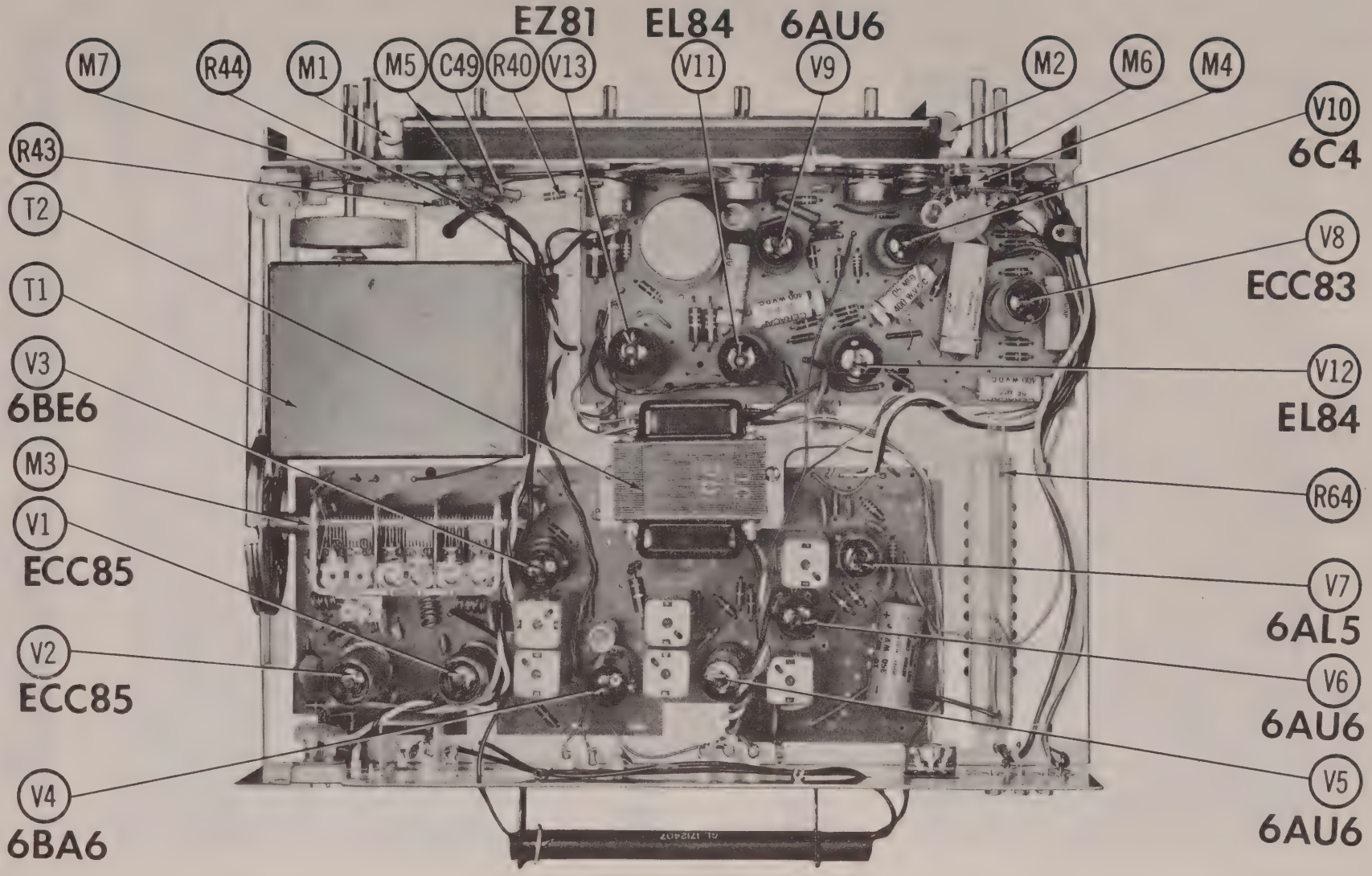
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

H646

SET 414 FOLDER 5



RF-IF SUB CHASSIS

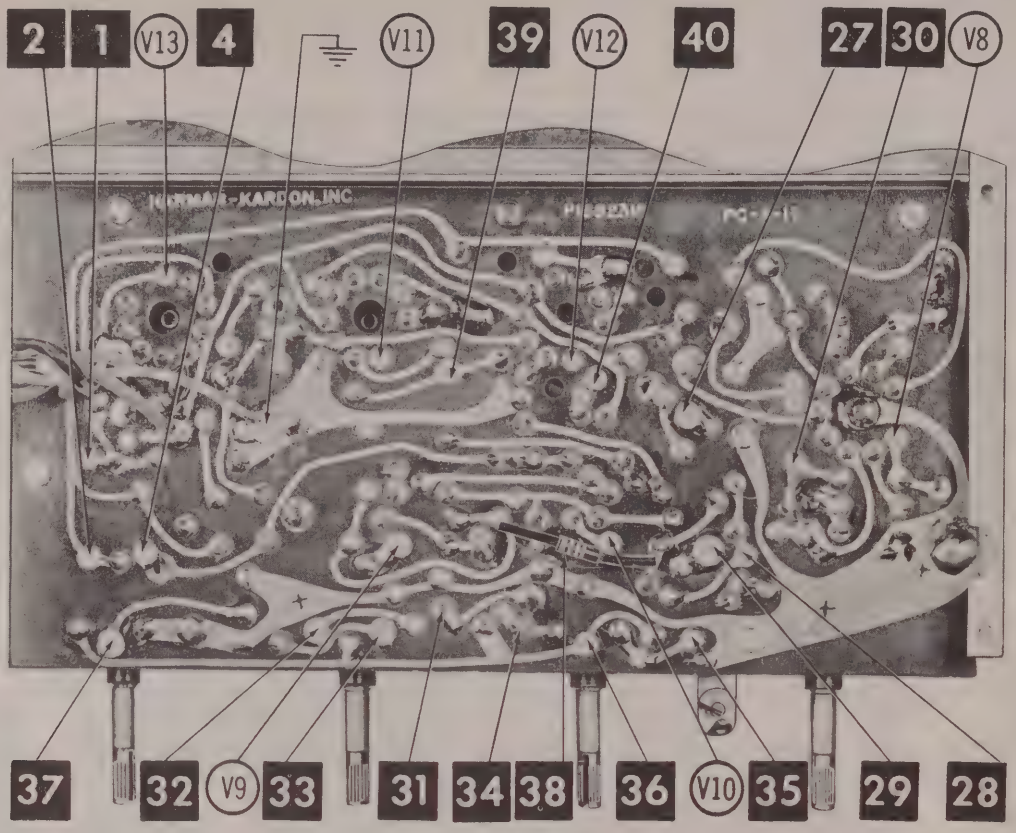


CHASSIS TOP VIEW

HARMAN-KARDON
MODEL TA-12

FOLDER 5

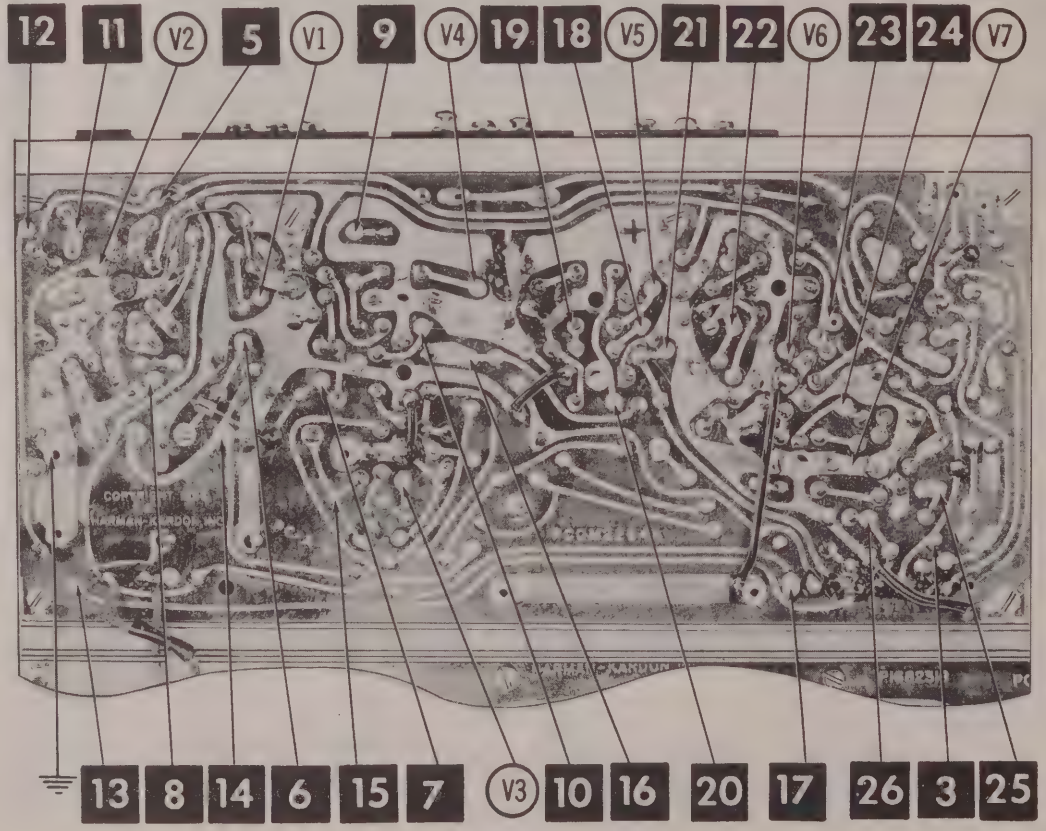
PAGE 3



A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK

AUDIO POWER
PRINTED BOARD

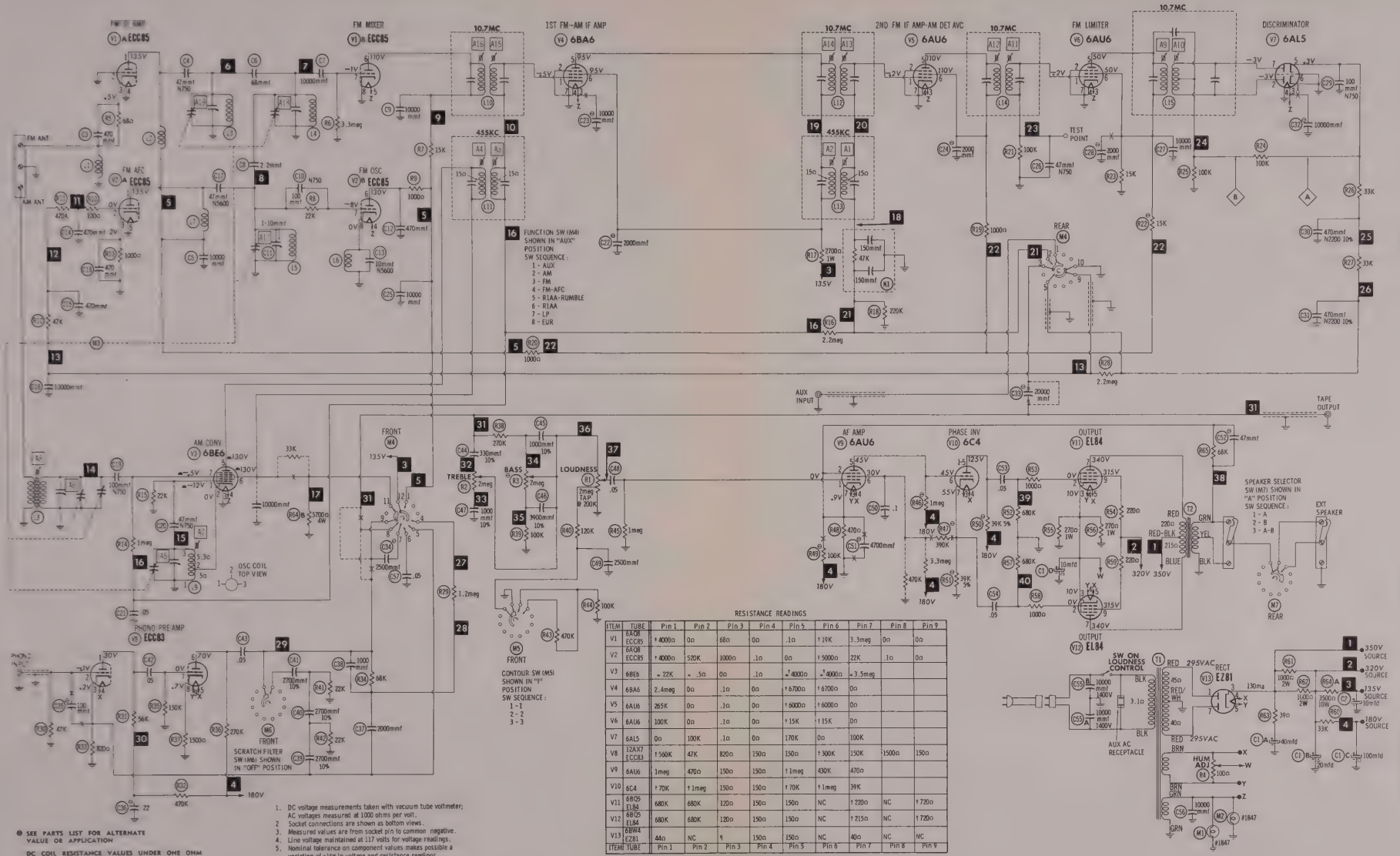
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK

RF-IF
PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AQ8 ECC85	↑4000Ω	0Ω	68Ω	0Ω	.1Ω	↑19K	3.3meg	0Ω	0Ω
V2	6AQ8 ECC85	↑4000Ω	520K	1000Ω	.1Ω	0Ω	↑5000Ω	22K	.1Ω	0Ω
V3	6BE6	←22K	←.5Ω	0Ω	.1Ω	→4000Ω	→4000Ω	←3.5meg		
V4	6BA6	2.4meg	0Ω	.1Ω	0Ω	↑6700Ω	↑6700Ω	0Ω		
V5	6AU6	265K	0Ω	.1Ω	0Ω	↑6000Ω	↑6000Ω	0Ω		
V6	6AU6	100K	0Ω	.1Ω	0Ω	↑15K	↑15K	0Ω		
V7	6AL5	0Ω	100K	.1Ω	0Ω	170K	0Ω	100K		
V8	12AX7 ECC83	↑560K	47K	820Ω	150Ω	150Ω	↑300K	150K	1500Ω	150Ω
V9	6AU6	1meg	470Ω	150Ω	150Ω	↑1meg	430K	470Ω		
V10	6C4	↑70K	↑1meg	150Ω	150Ω	↑70K	↑1meg	39K		
V11	6BQ5 EL84	680K	680K	120Ω	150Ω	150Ω	NC	↑220Ω	NC	↑720Ω
V12	6BQ5 EL84	680K	680K	120Ω	150Ω	150Ω	NC	↑215Ω	NC	↑720Ω
V13	6BW4 EZ81	44Ω	NC	¶	150Ω	150Ω	NC	40Ω	NC	NC
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
↑ MEASURED FROM PIN 3 OF V13.
← MEASURED IN "AM" POSITION.
NC NO CONNECTION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements

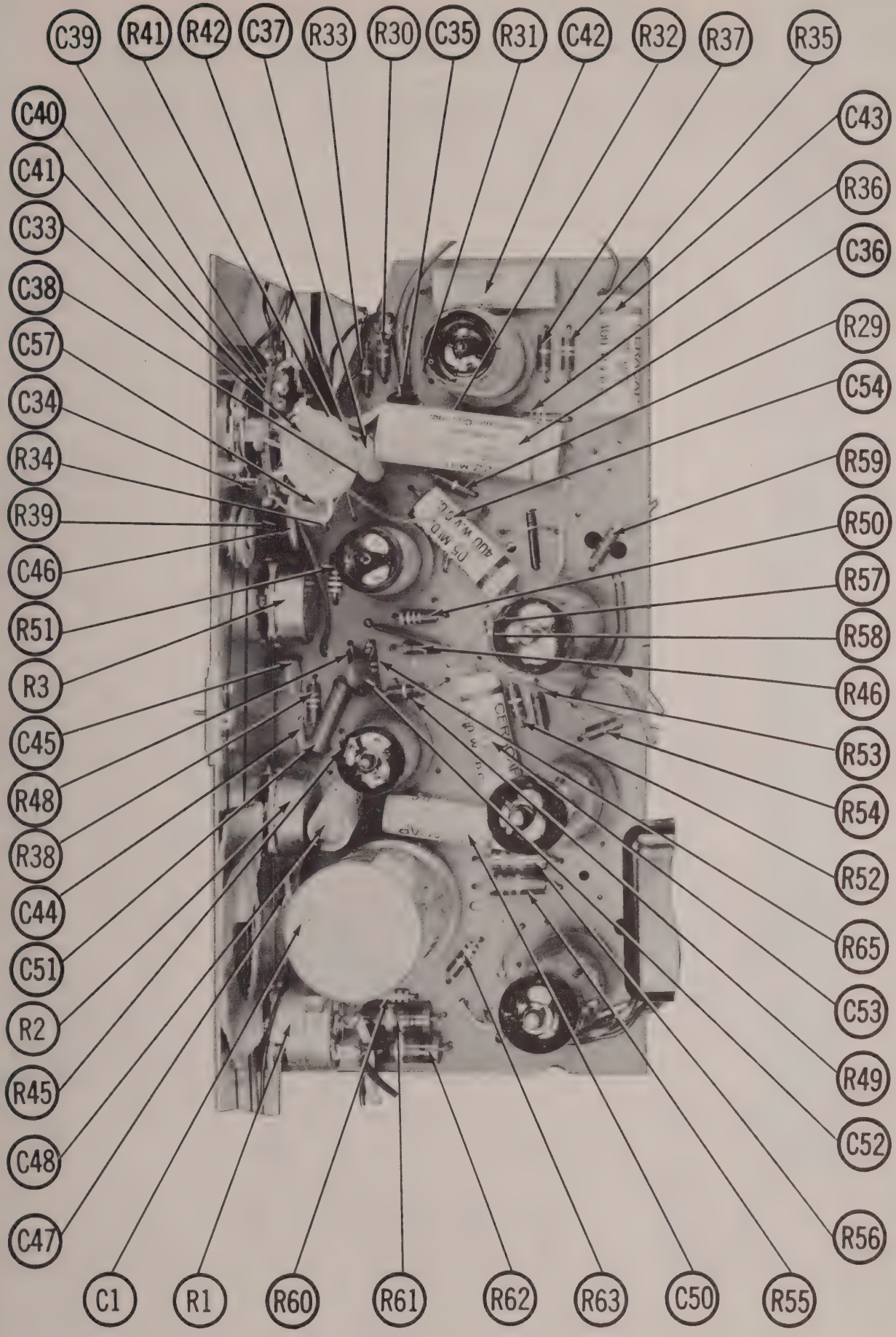
⊛ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

©Howard W. Sams & Co., Inc. 1958

414-5



AUDIO-POWER SUB CHASSIS

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01mfd	High side to AM antenna stator lug of tuning gang. Low side to chassis.	455KC (400∿ Mod)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	High side to AM antenna terminal. Low side to chassis.	1500KC	"	1500KC	"	A5, A6	"
3.	"	"	600KC	"	600KC	"	A7, A8	Adjust for maximum output. Repeat steps 2 and 3.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	200mmf	High side to pin 1 (grid) of 6AU6 (V6). Low side to chassis.	10.7MC (Unmod)	FM	Point of non-interference	DC probe to point (A). Common to chassis.	A9	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point (B). Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	"	High side to pin 7 (grid) of ECC85 (V1). Low side to chassis.	"	"	"	DC probe to point (A). Common to chassis.	A11, A12, A13, A14, A15, A16	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	200mmf	High side to pin 1 (grid) of 6AU6 (V6). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point (A). Low side to chassis.	A9	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
5.	"	"	"	"	"	Vert. Amp. to point (B). Low side to chassis.	A10	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.
6.	"	High side to pin 7 (grid) of ECC85 (V1). Low side to chassis.	"	"	"	Vert. Amp. to point (A). Low side to chassis.	A11, A12, A13, A14, A15, A16	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	270Ω Carbon Resistor	High side thru 270Ω to FM antenna terminal. Low side to chassis.	108MC	FM	108MC	DC probe to point (A). Common to chassis.	A17	Adjust for maximum deflection.
8.	"	"	106MC	"	Tune to 106MC signal	"	A18, A19	"
9.	"	"	90MC	"	90MC	"	L5, L4, L3	Adjust for maximum deflection by compressing or expanding coil turns while rocking gang. Repeat steps 8 and 9.

FIG. 1

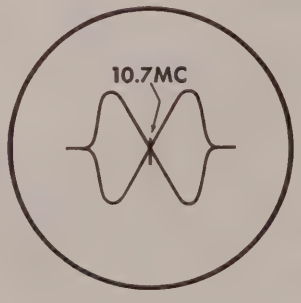
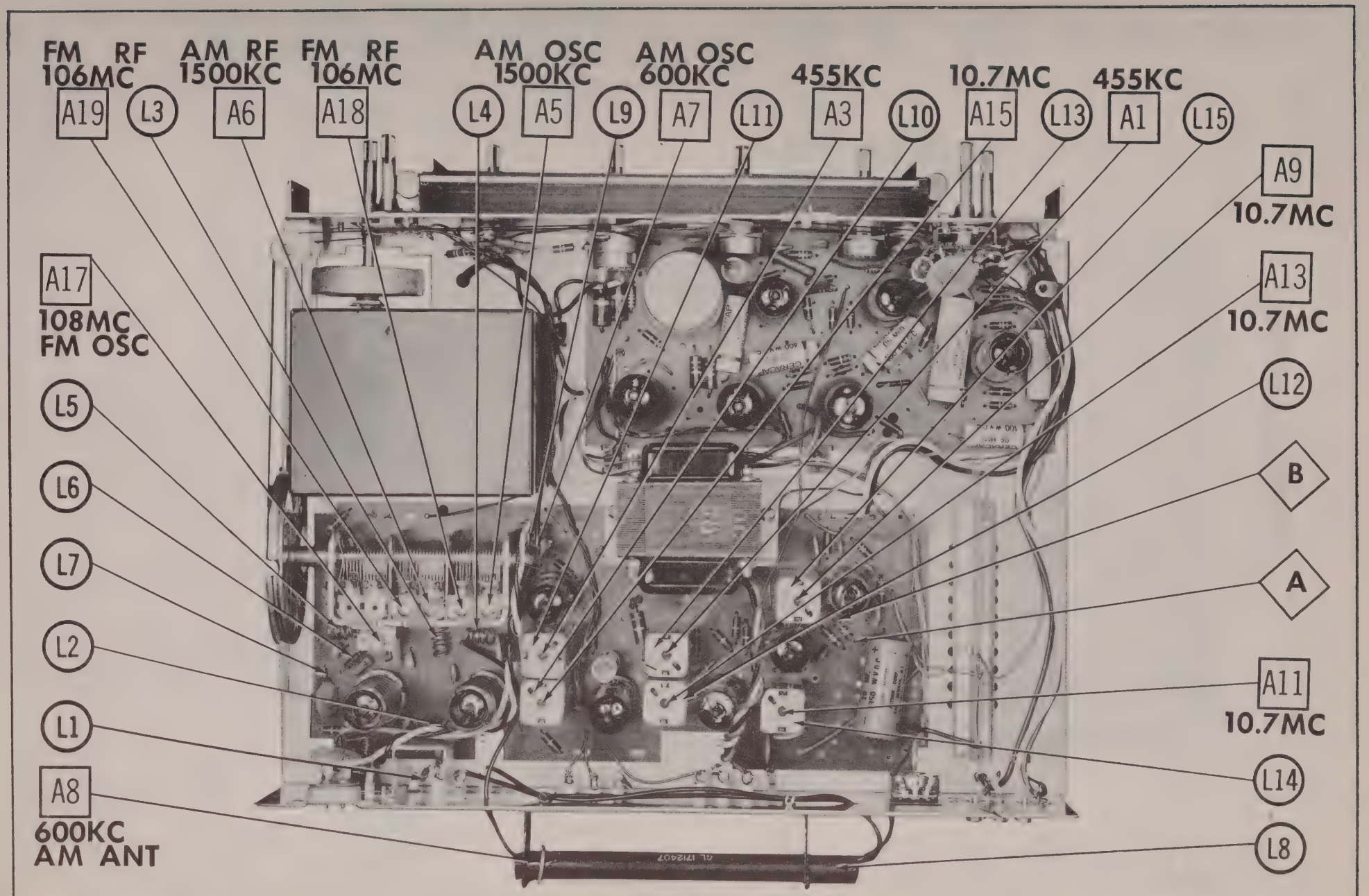


FIG. 2



CHASSIS TOP VIEW—INDUCTOR AND ALIGNMENT IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE
V1	FM RF Amp. -FM Mixer	ECC85/6AQ8 ①
V2	FM Osc. -AFC	ECC85/6AQ8 ①
V3	AM Converter	6BE6
V4	1st. FM-AM IF Amp.	6BA6
V5	2nd. FM IF Amp. - AM Det. -AVC	6AU6
V6	FM Limiter	6AU6

ITEM No.	USE	TYPE
V7	FM Discriminator	6AL5
V8	Phono Preamplifier	ECC83/12AX7 ①
V9	AF Amp.	6AU6
V10	Phase Inv.	6C4
V11	Output	EL84/6BQ5 ①
V12	Output	EL84/6BQ5 ①
V13	Rectifier	EZ81/6BW4 ①

① Domestic types listed may not be directly interchanged in all instances.

ELECTROLYTIC CAPACITORS

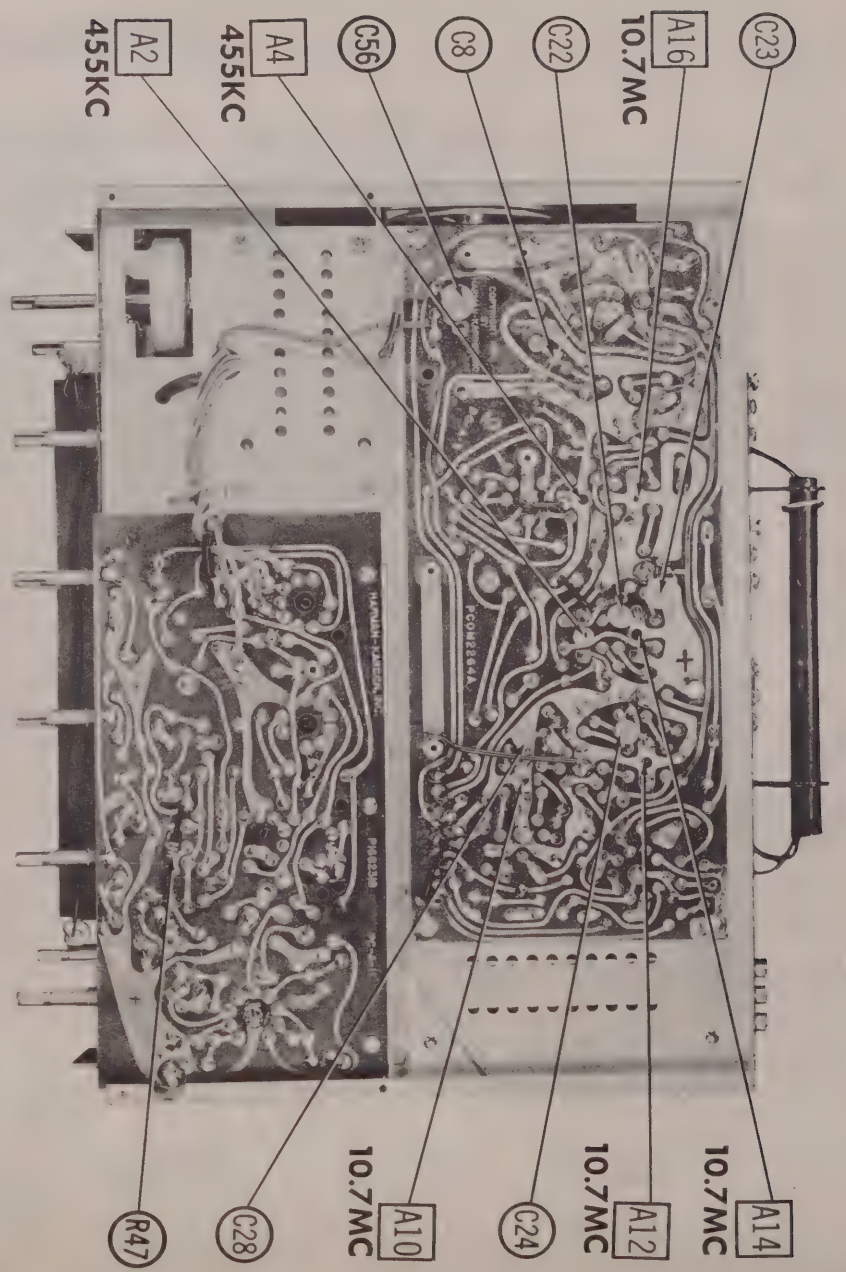
ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Harman-Kardon PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	40	350	JE621281						PCL-4627
B	▲20	350							
C	■10	350							
D	▲100	50							
C2	10	350		PRS350V10	BR1045	TC62	TD-10-450	MT-4510	TVA-1604

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Harman-Kardon PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	470			SI 470	D6-471	L10T47	UC-5347	5GA-T47	
C4	47			N750-DI 47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750
C5	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C6	.68			NPO-SI .68	TCZ-R68				
C7	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C8	2.2			NPO-SI 2.2	TCZ-2R2	CTA6V22C		5TCCB-V22	
C9	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C10	100			NPO-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C11	1-10		JV20688						
C12	470			BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C13	10								N5600
C14	470			BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C15	470			BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C16	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C17	47								N5600
C18	470			BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C19	100			N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C20	47			N750-DI 47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750
C21	.05	200		P288N-05	DF-503	BC2S47J	ACE615	2TM-S5	
C22	2000			BPD-002	DD-202	BYA10D2	DC522	5HK-D2	①
C23	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	②③
C24	2000			BPD-002	DD-202	BYA10D2	DC522	5HK-D2	③
C25	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C26	47			N750-DI 47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750
C27	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C28	2000			BPD-002	DD-202	BYA10D2	DC522	5HK-D2	②
C29	100			N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C30	470								N2200 10%
C31	470								N2200 10%
C32	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	②③④
C33	20000			BPD-02	DD-203	BYB6S2		5GA-S2	②③④
C34	2500			SI 2500	D6-252	LT6D25	UC-5225	5GA-D25	②③④
C35	100			BPD-0001	DD-101	L10T1	UC-531	5GA-T1	②③④
C36	.22	200		P288N-22		CUB2P22	GEM-2022	2TM-P22	④

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA Harman-Kardon PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C37	2000			BPD-002	DD-202	BYA10D2	DC522	5HK-D2	
C38	1000			BPD-001	DD-102	BYA10D1	DC521	5HK-D1	
C39	2700								10%
C40	2700								10%
C41	2700								10%
C42	.05	200		P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	
C43	.05	400		P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C44	330				MD-331	L10T33			10%
C45	1000								10%
C46	3900								10%
C47	1000								10%
C48	.05	200		P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	
C49	2500			SI 2500	D6-252	LT6D25	UC-5225	5HK-D25	
C50	.1	200		P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C51	4700			SI 4700	D6-472	LT6D47	UC-5247	5HK-D47	②
C52	47			BPD-000047	DD-470	L10Q47	UC-5447	5GA-Q47	⑤
C53	.05	400		P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C54	.05	400		P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C55A	10000	1400		DAC-27		HVE16S1		20HKB-S1	
B	10000	1400		DAC-27		HVE16S1		20HKB-S1	
C56	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C57	.05	200		P288N-05	DF-503	CUB2S5	GEM-215	2TM-S5	

① Some versions may use 10000mmf in this application.
② Not used in some versions.
③ Some versions may use 1000mmf 10% in this application.
④ Some versions may use .05mfd in this application.
⑤ Some versions may use 100mmf in this application.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Harman-Kardon PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2meg	½	RV1712320					Loudness, Tap ⓐ 200K
B	Switch							
R2	2meg	½	RV1712321					Treble
R3	2meg	½	RV1712321					Bass, Note 1
R4	100Ω	½	RVCOM2411					Hum Adjustment

Note 1. Part #RV1712322 may be used in some versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	Harman-Kardon PART No.	NOTES	ITEM No.	RATING OHMS	RATING WATT	Harman-Kardon PART No.	NOTES
R5	68Ω				R25	100K			
R6	3.3meg				R26	33K			
R7	15K				R27	33K			
R8	22K				R28	2.2meg			
R9	1000Ω				R29	1.2meg			
R10	100Ω				R30	47K			
R11	470K				R31	56K			
R12	47K				R32	470K			
R13	1000Ω				R33	820Ω			
R14	1meg				R34	68K			
R15	22K				R35	150K			
R16	2.2meg				R36	270K			
R17	2700Ω	1			R37	1500Ω			
R18	220K				R38	270K			
R19	1000Ω				R39	100K			
R20	1000Ω				R40	120K			
R21	100K				R41	22K			
R22	15K			Note 1	R42	22K			
R23	15K				R43	470K			
R24	100K				R44	100K			

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	Harman-Kardon PART No.	NOTES
R45	1meg			
R46	1meg			Note 2
R47	390K			Note 3
R48	470Ω			
R49	100K			Note 3
R50	39K 5%			Note 4
R51	39K 5%			Note 4
R52	680K			
R53	1000Ω			
R54	220Ω			
R55	270Ω	1		

ITEM No.	RATING OHMS	RATING WATT	Harman-Kardon PART No.	NOTES
R56	270Ω	1		
R57	680K			
R58	1000Ω			
R59	220Ω			
R60	33K			
R61	1000Ω	2		
R62	1000Ω	2		
R63	39Ω			
R64A	3500Ω	10		
B	5700Ω	4		
R65	68K			

Note 1. Some versions may use 10K in this application.
Note 2. Some versions may use 1.2meg in this application.
Note 3. Not used in some versions.
Note 4. R50 and R51 are a matched pair.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA Harman-Kardon PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	FM Ant. Coil				4584		.24 Microhenry
L2	RF Choke						3.3 Microhenries
L3	FM RF Coil	GL781543					
L4	FM Mixer						
	Grid Coil	GL781543					
L5	FM Osc. Coil	GL781544					
L6	Cathode Choke		19-1000	BC-561	4602		1 Microhenry
L7	RF Choke						3.3 Microhenries
L8	Loop Stick	GL1712407					
	Loop Tuning Ring	P481329					
L9	AM Osc. Coil	GL1121988					
L10	1st. FM IF	GT781993	16-3490		1463-PC		
L11	1st. AM IF	GT782122	16-6780	BC-356	13-PC1	RF-4	
L12	2nd. FM IF	GT781994	16-3490		1463-PC		
L13	2nd. AM IF	GT782123	16-6780	BC-357	13-PC2	RF-4	
L14	3rd. FM IF	GT781995	16-3490		1463-PC		
L15	Discriminator	GT782124					

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA Harman-Kardon PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ⓐ .95A	540VCT ⓐ .130A	6.3V ⓐ 3.1A	FT1712365						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V ⓐ 2.5A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA Harman-Kardon PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	7000Ω CT	16Ω tap ⓐ 8Ω	FT1712364	Z1405 ①			A-3304 ①	24S58 ①	S-31A ①	① Use original shields.

PARTS LIST AND DESCRIPTIONS (Continued)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Harman-Kardon PART No.	REPLACEMENT DATA
K1	Diode RF Filter	150mmf, 150mmf, 47K	PC781599	Aerovox PA-98 Centralab PC-51 Cornell-Dubilier 111TM2 Sprague D-2

MISCELLANEOUS

ITEM No.	PART NAME	Harman-Kardon PART No.	NOTES
M1	Dial Lamp		#1847
M2	Dial Lamp		#1847
M3	Tuning Cap.	JVCOM2183	6 Gang AM-FM
M4	Switch	ER1712315	9 Position, Wafer, Rotary (Function)
M5	Switch	ER1712323	3 Position, Wafer, Rotary (Contour)
M6	Switch	ER1712319	2 Position, Wafer, Rotary (Scratch Filter)
M7	Switch	ER1712324	2 Position, Wafer, Rotary (Speaker)
	Printed Board	PC-A-5	
	Printed Board	PC-A-11	

CABINETS & CABINET PARTS

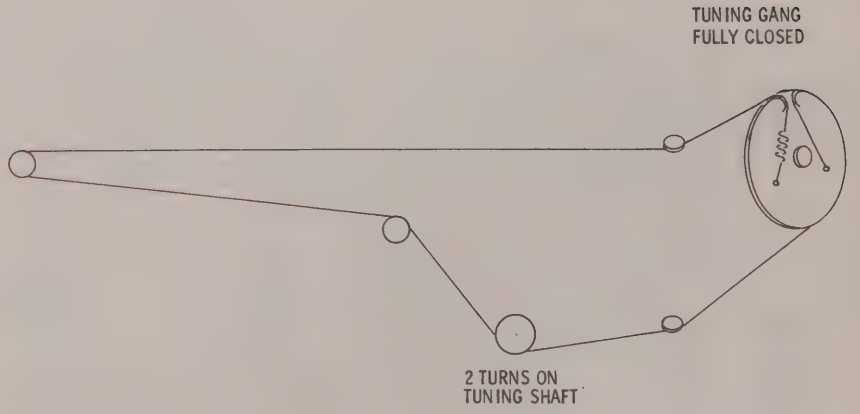
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	P20778	With White Line
Knob	P20783	With White Line, Small
Cage	P1712311	
Pointer	P1712390	
Dial Scale	P1712384	AM-FM, Glass

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

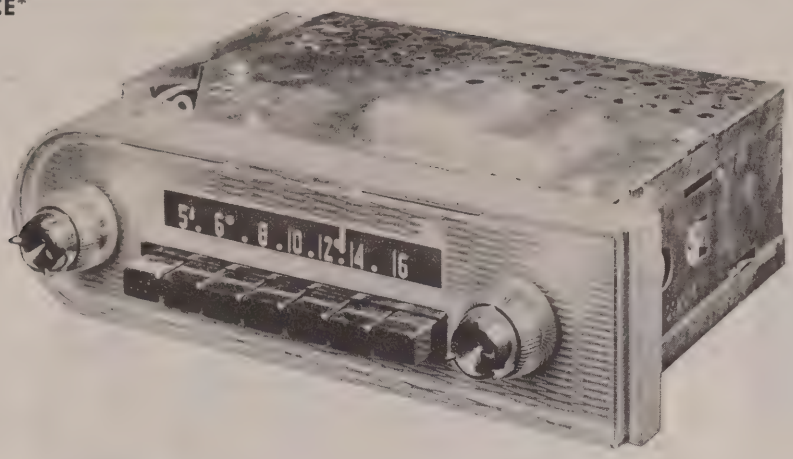
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)



DIAL CORD STRINGING

PHOTOFACT* Folder with CIRCUITRACE*

MOPAR MODEL 922 (85BC)



TRADE NAME	Mopar Model 922 (85BC) For 1958 Chrysler Automobiles
MANUFACTURER	Bendix Radio Div. Bendix Aviation Corp., Baltimore 4, Maryland
TYPE SET	Battery Operated Custom Built AM Automobile Receiver With Transistorized Output
TUBES (Five)	Types 12CX6 RF Amplifier, 12AD6 Converter, 12CN5 IF Amplifier, 12J8 Det.-AVC-Relay-Driver, 12U7 AF Amp.-Trigger
POWER SUPPLY	12 Volts DC
RATING	2 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	530 - 1605KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at MINIMUM, tone control fully clockwise. Output of signal generator should be no higher than necessary to obtain an indication. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of 12AD6 (V2). Low side to chassis.	262.5KC (Unmod.)	High frequency end stop	DC probe to point (A). Common to pin 7 (Cath.) 12J8 (V4).	A1, A2, A3, A4	Adjust for maximum deflection.
2.	Fig. 1	Thru dummy to antenna receptacle	1605KC	"	"	A5, A6, A7	"
3.	With radio installed in car and antenna fully extended, tune in a weak station near 1600KC and adjust A7 for maximum output. Step 4 is not necessary unless tuner has been tampered with or associated components have been replaced. If necessary, back tuning cores (A8, A9, A10) out of coils but not out of coil forms. Repeat step 2.						
4.	Fig. 1	Thru dummy to antenna receptacle	1000KC (Unmod.)	Tuning carriage ½" from high frequency end stop	DC probe to point (A). Common to pin 7 (Cath.) 12J8 (V4).	A8, A9, A10	Adjust for maximum deflection. Repeat steps 2 and 4.
	To adjust sensitivity controls, disconnect VTVM; set volume to maximum and tone fully clockwise. Proceed with step 5.						
5.	Fig. 1	Thru dummy to antenna receptacle	1000KC @ 3 Microvolts (400~ Mod.)	Tune to 1000KC signal	Output Meter Across voice coil	R6	Adjust for 1.75V (Approx. 1W) output.
6.	"	"	1000KC @ 250 Microvolts	"	"	R3	Set R3 maximum counterclockwise. Press "Distant" button to start set searching. Turn R3 slowly until tuner stops.
7.	Adjust generator to 1000KC @ 125 Microvolts. Press "Local" button. Tuner should continue to seek.						

PUSHBUTTON ADJUSTMENT

1. Tune manually to desired station.
2. Pull out pushbutton; then press in firmly.
3. Repeat for remaining buttons.

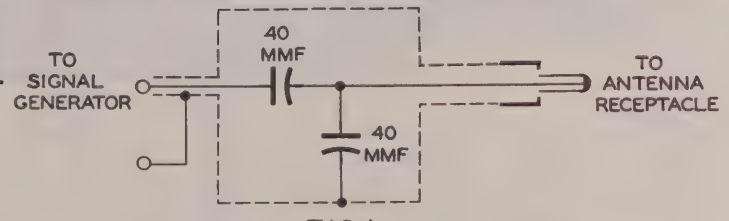


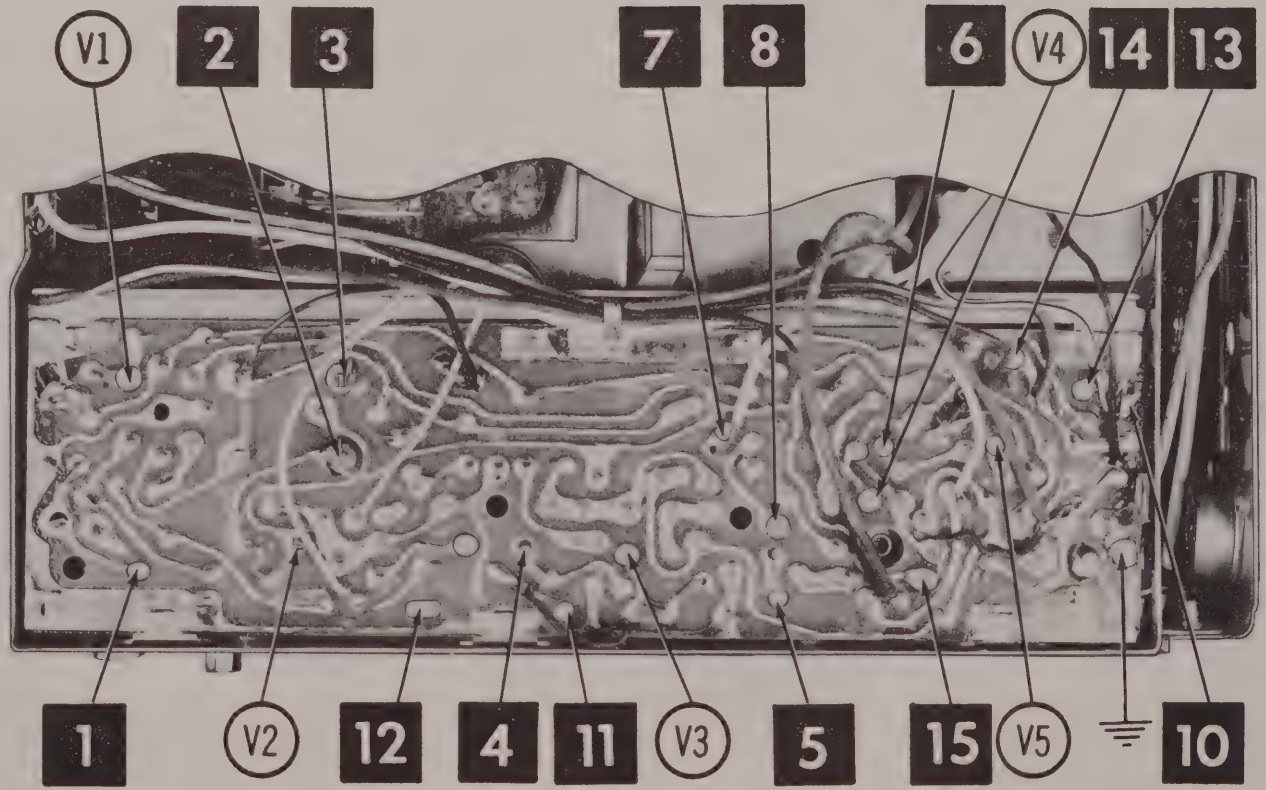
FIG. 1

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

H577

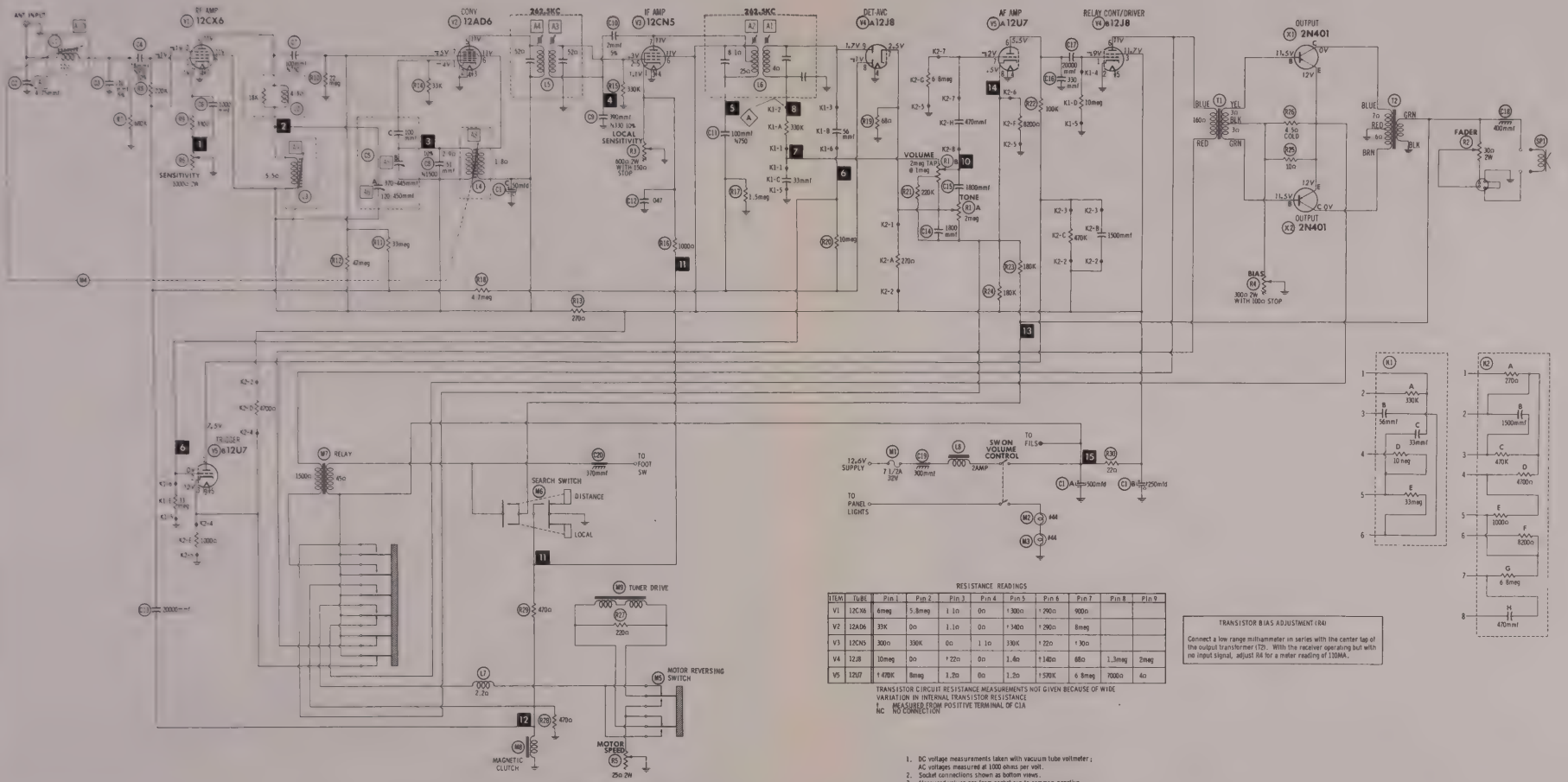
MOPAR MODEL 922 (85BC)
MOPAR MODEL 922 (85BC)
SET 414 FOLDER 6



A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK

PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



SEARCH SPEED ADJUSTMENT (R5)

Connect a power source of 13.2 volts DC to the receiver. Adjust R5 for a search speed of 11 seconds per cycle (from one end of the dial to the other end and back to the starting point).

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12CX6	6meg	5.8meg	1.1Ω	0Ω	300Ω	290Ω	900Ω		
V2	12AD6	33K	0Ω	1.1Ω	0Ω	340Ω	290Ω	8meg		
V3	12CN5	300Ω	330K	0Ω	1.1Ω	330K	22Ω	30Ω		
V4	12J8	10meg	0Ω	22Ω	0Ω	1.4Ω	140Ω	68Ω	1.3meg	2meg
V5	12U7	470K	8meg	1.2Ω	0Ω	1.2Ω	570K	6.8meg	7000Ω	4Ω

TRANSISTOR CIRCUIT RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE

1. MEASURED FROM POSITIVE TERMINAL OF C1A
NC NO CONNECTION

TRANSISTOR BIAS ADJUSTMENT (R4)

Connect a low range milliammeter in series with the center tap of the output transformer (T2). With the receiver operating but with no input signal, adjust R4 for a meter reading of 110MA.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±5% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements.

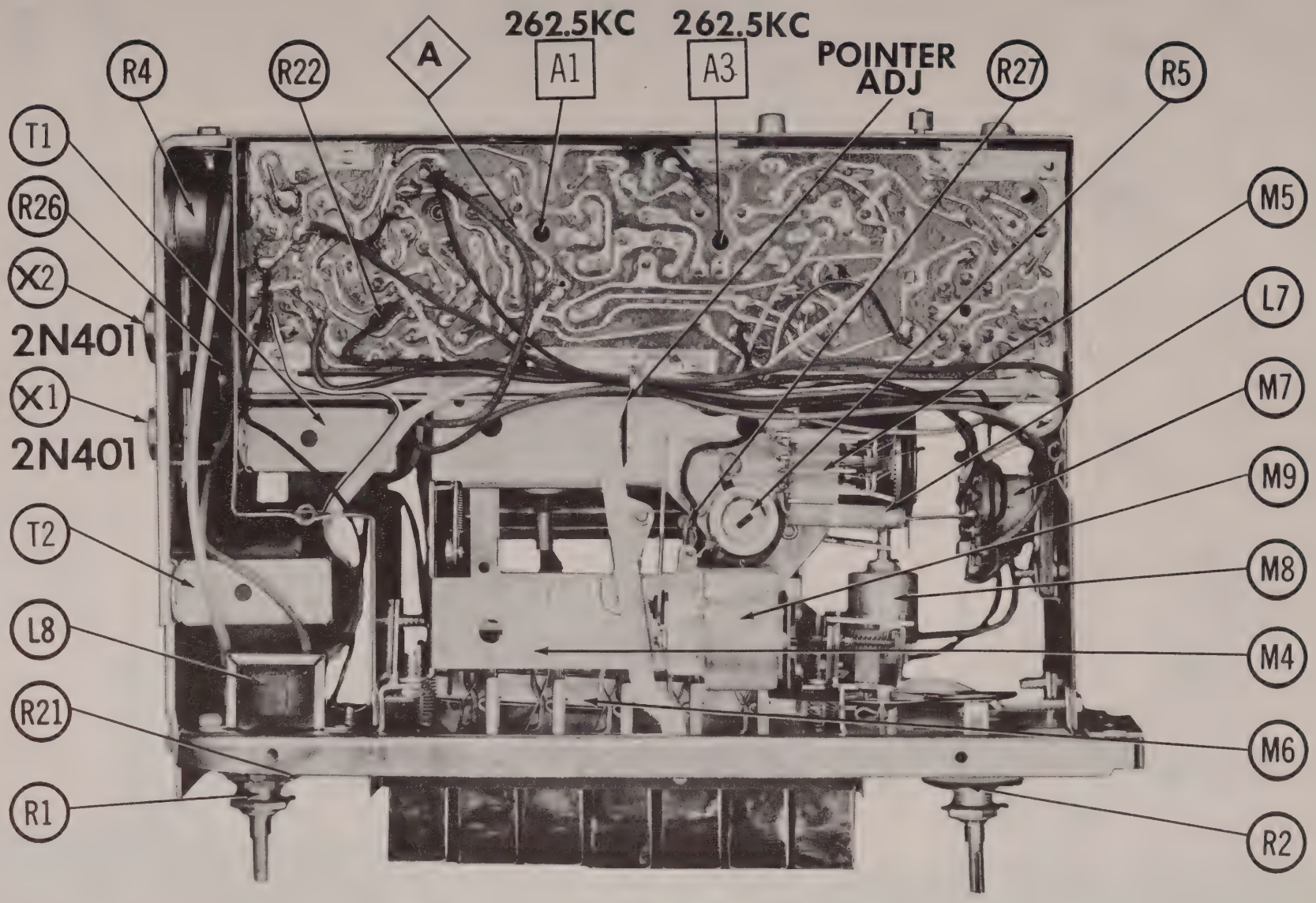
● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

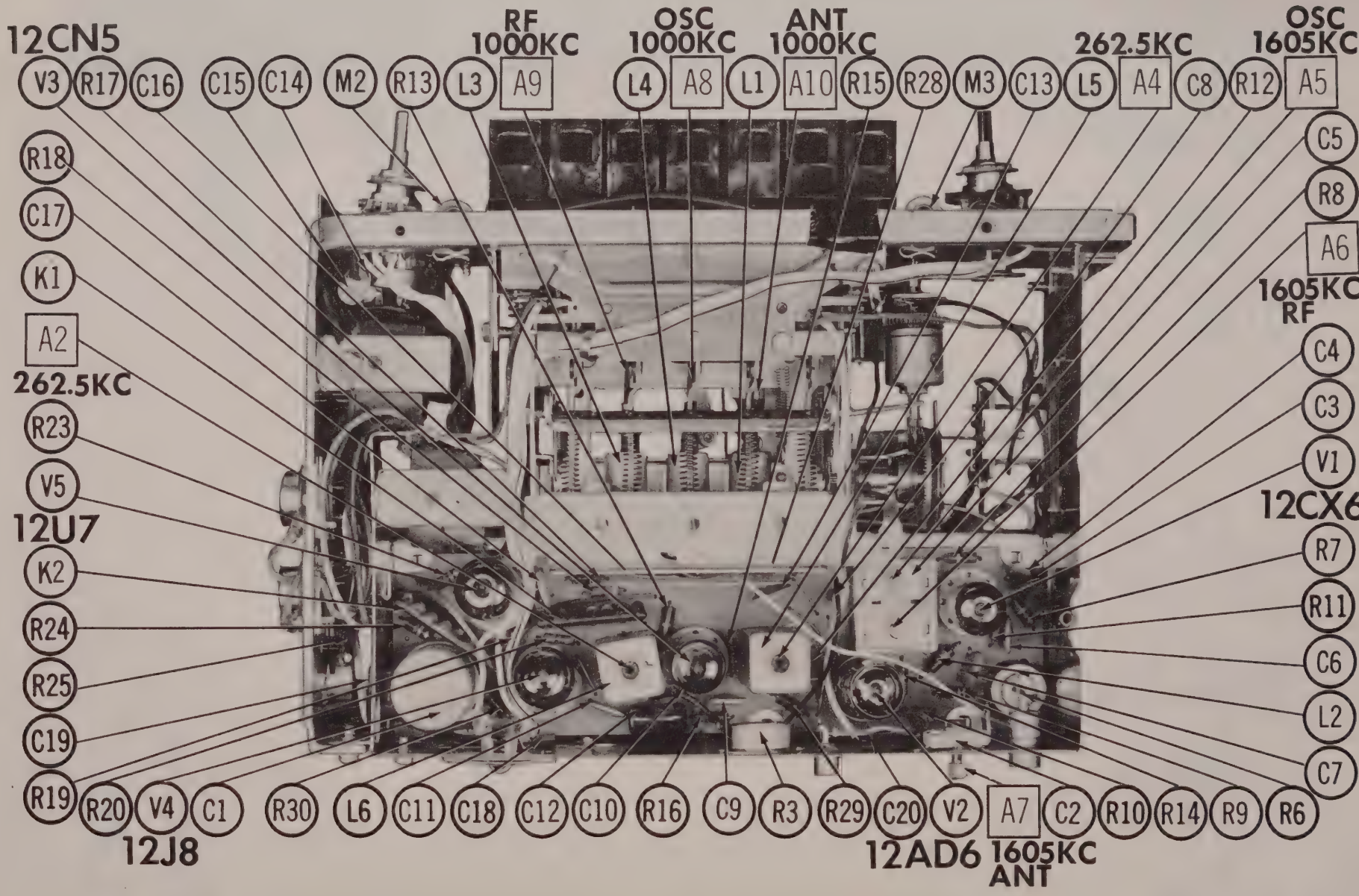
A PHOTOFACT STANDARD NOTATION SCHEMATIC
CIRCUITRACE

©Howard W. Sams & Co., Inc. 1958

414-6



CHASSIS-BOTTOM VIEW



CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	12CX6	
V2	Converter	12AD6	
V3	IF Amplifier	12CN5	
V4	Det.-AVC-Relay-Driver	12J8	
V5	AF Amp.-Trigger	12U7	

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N401	Output	CBS-2N401			2N350	PNP
X2	2N401	Output	CBS-2N401			2N350	PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	BENDIX PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	500	16	220353-7	AFH3-00-93					R2685 *
B	▲250	16							
C	■50	16							

* Non-Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	BENDIX PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	4-75		219083-1						
C3	110		220348-406	1469-00011	TCZ-110	22R5T11		MS-311	5%
C4	18		220332-33						NPO 10%
C5A	120-450								
B	370-445		219092-2						
C	100								
C6	1000		220332-36	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C7	100		220332-37	N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C8	51		220332-22						N1500 10%
C9	390		220332-34						N330 10%
C10	2		220212-11						5%
C11	100		220332-37	N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C12	.047	100	2090585-9	P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C13	20000		220332-24	BPD-02	DD-203	BYB6S2		5HK-S2	
C14	1800		2090058R-182M	DI-1800	DD-182	L10D18	UC-5218	5GA-D18	
C15	1800		2090058R-182M	DI-1800	DD-182	L10D18	UC-5218	5GA-D18	
C16	330		220332-25	DI-330	DD-331	L10T33	UC-5333	5GA-T33	
C17	20000		220332-24	BPD-02	DD-203	BYB6S2		5HK-S2	
C18	400		220267-10						
C19	300		220267-12						
C20	370		220267-6						

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	BENDIX PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2meg	½	2090616-2	F1-67 †				Tone
B	2meg	½		R2-72				Volume, Tap ② 1meg
C	Switch			KB-7 or KR-7*				Power On-Off
R2	30Ω	2(WW)	2090627-1					Speaker Fader
R3	600Ω	2	219555-14					Local Sensitivity, With 150Ω Stop
R4	300Ω	2	219555-17					Transistor Bias, With 100Ω Stop
R5	25Ω	2	219555-12					Motor Speed
R6	1000Ω	2	219682-2					Sensitivity

† Use AK-28 Adaptor Bushing.
* Use KR with CRL "Red Label" Controls and KB with "Blue Label" Controls.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		BENDIX PART No.	NOTES
	OHMS	WATT		
R7	680K		220604B-684	
R8	220K		220604B-224	
R9	330Ω		220604B-331	
R10	22meg		220604B-226	
R11	33meg		220604B-336	
R12	47meg		220604B-476	
R13	270Ω		220604B-271	
R14	33K		220604B-333	
R15	330K		220604B-334	
R16	1000Ω		220604B-102	
R17	1.5meg		220604B-155	
R18	4.7meg		220604B-475	

ITEM No.	RATING		BENDIX PART No.	NOTES
	OHMS	WATT		
R19	68Ω		220603B-680	
R20	10meg		220603B-106	
R21	220K		220604B-224	
R22	100K		220604B-104	
R23	180K		220604B-184	
R24	180K		220603B-184	
R25	10Ω		220604B-100	
R26	4.5Ω Cold		220629-1	
R27	220Ω		220604B-221	
R28	470Ω		220604B-471	
R29	470Ω		220604B-471	
R30	22Ω		220604B-220	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					NOTES
		BENDIX PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Antenna Coil	*					
L2	IF Trap Coil	2090088-1					50 Microhenries; wound on 18K
L3	RF Coil	*					
L4	Osc. Coil	*					
L5	Input IF	2090239-3					
L6	Output IF	2090237-4					
L7	RF Choke	2090671-1	19-1003	BC-564	4608		3.9 Microhenries; IRC Part #CLA

* Part of Tuner Coil Assembly (Part #2090131-11).

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ∿)	BENDIX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L8	2A	.2Ω	.0005 Hy.	2090520-2						

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA							NOTES
	PRI.	SEC.	BENDIX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	7	: 1	2090265-4							

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	BENDIX PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	45ΩCT	3-4Ω	2090554-2							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	BENDIX PART No.	QUAM PART No.	
SP1	5½" X 7½"	PM	3-4Ω	2090744-2	57A21	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	BENDIX PART No.	REPLACEMENT DATA
K1	Audio Couplate	33mmf, 56mmf, 330K, 33meg, 10meg	2090525-1	
K2	Search Control Plate	470mmf, 1500mmf, 270Ω, 1000Ω, 8200Ω, 470K, 6.8meg, 4700Ω	2090528-1	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			BENDIX PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	SFE	7½A 32V	SFE-7½	221633-9	30307.5 (7½A 32V)	155009	SFE 7½	HDH

MISCELLANEOUS

ITEM No.	PART NAME	BENDIX PART No.	NOTES
M2	Lamp	44	#44
M3	Lamp	44	#44
M4	Tuner	2090593-4	Complete
M5	Switch	2090759-1	Motor Reversing, Part of Motor Mtg. Plate Ass'y. Part #2090759-1
M6	Switch	2090630-1	Search, Complete Ass'y. includes Local, Distant Switch
M7	Relay	2090507-1	Search, Listen, includes Mtg. Board Ass'y.
M8	Clutch Ass'y	2090046-5	Magnetic
M9	Motor	2090533-1	Tuner Drive
	Printed Board	2090743-1	

PARTS LIST AND DESCRIPTIONS (Continued)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	2090610-2	Assembly
Disc	2090611-1	Tone and Fader
Pushbutton Ass'y	2090694-2	Local
Pushbutton Ass'y	2090694-3	Distant
Pushbutton Ass'y	2090694-1	Stations
Cover	2090587-1	Top
Cover	2090588-1	Bottom
Pointer Ass'y	2090129-10	
Sub Dial	2090595-2	

WIRING DATA

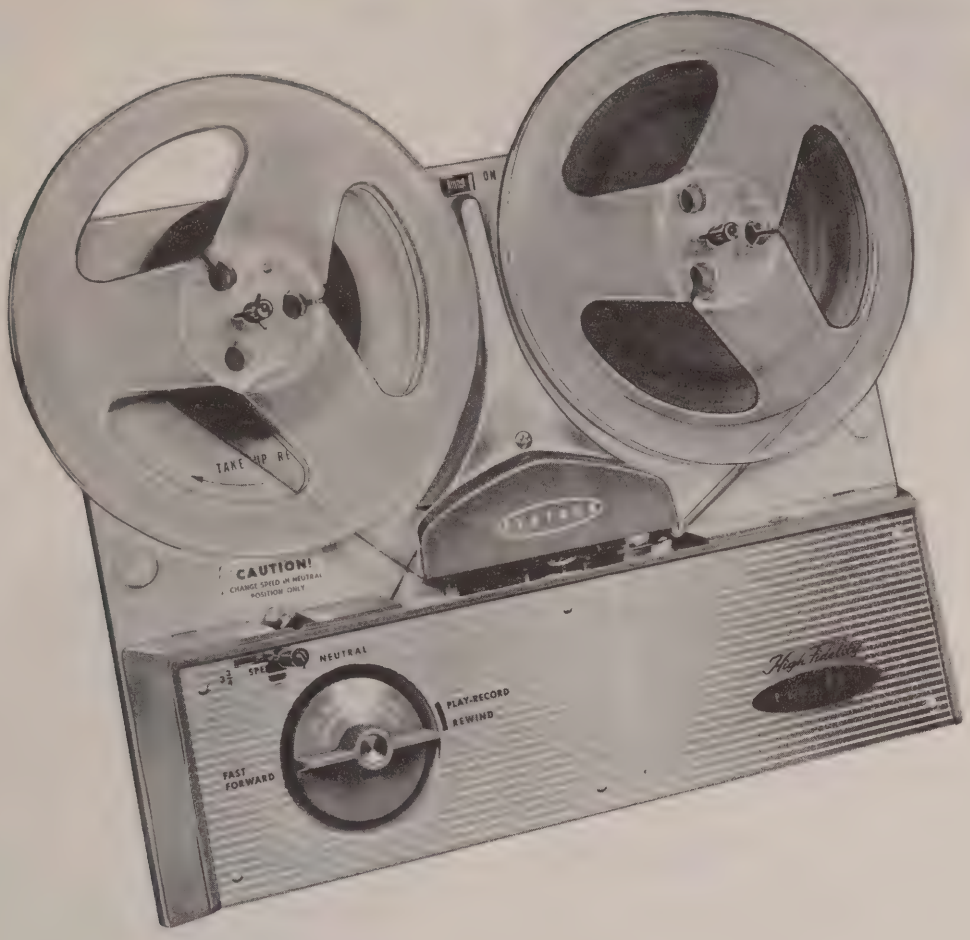
General-use Shielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire ..... Use BELDEN No. 8885
Bonding Strap ..... Use BELDEN No. 8661

PHOTOFACT* Folder

EIA

PENTRON MODELS NL-1, -1S, NL-2, -2S, NL-3, -3S, TM-1, -4

PENTRON MODELS NL-1, -1S, NL-2, -2S, NL-3, -3S, TM-1, -4



PENTRON MODELS NL-1, -1S, NL-2, -2S, NL-3, -3S, TM-1, -4

GENERAL INFORMATION

Pentron Models NL-1, NL-1S, NL-2, NL-2S, NL-3, and NL-3S are designed for making and playing back tape recordings at either 3 3/4 inches per second or 7 1/2 inches per second. Recording is dual track so that two full length recordings can be made on a single reel of tape. Any size reel up to 7" may be used on these machines and therefore a recording time of 3 hours or more can be had, depending upon the tape thickness.

Models TM-1 and TM-4 are identical except for the sterophonic heads used in Model TM-4.

These Models are for operation on a 60 cycle 105 to 120 volts, AC supply only. Before connecting to your line supply, make certain that it agrees with the above specifications.

Manufactured by :

Pentron Corporation
777 South Tripp Avenue
Chicago 24, Illinois

This material compiled and published by

HOWARD W. SAMS & CO., INC., INDIANAPOLIS, INDIANA

C366

Copyright 1958 • All Rights Reserved

MODEL NL-1

MODEL NL-2

MODEL NL-3

TABLE OF CONTENTS

	Page
General Information	1
Specifications	3
Functions of: Controls, Indicators, & Switches	4
Operating Instructions	7
Mechanical Adjustments	8
Parts Replacement	10
Lubrication	13
Cleaning	13
Exploded View Of Parts Above Mechanism Plate	14
Exploded View Of Parts Below Mechanism Plate	15
Mechanical Troubles And Probable Remedies	16
Electrical Troubles And Probable Remedies	17
Schematic Diagram — Model NL-1	19
Schematic Diagram — Model NL-2	21
Schematic Diagram — Model NL-3	22
Mechanical Parts List — Models TM-1, NL-1, NL-2, & NL-3.	27
Electrical Parts List — Model NL-1	23
Electrical Parts List — Model NL-2	24
Electrical Parts List — Model NL-3	25

SPECIFICATIONS

TM-1 Transport Mechanism

SPEEDS: Record and playback, 7 1/2 and 3 3/4 ips.
FAST FORWARD: Complete wind of a 7 inch reel in 75 seconds.
REWIND: Complete rewind of a 7 inch reel in 90 seconds.
FLUTTER: Under 0.4% at 7 1/2 ips.
Under 1 % at 3 3/4 ips.
MOTOR: Heavy duty 4 pole, shaded pole motor, dynamically and individually balanced.
CONTROL: Single rotary control for Play, Record, Fast Forward, and Rewind.

TM-4 Transport Mechanism

The TM-4 mechanism is the same as TM-1 except that it uses a stacked "stereo" head assembly.

NL-1 Recorder

FREQUENCY RESPONSE: 40 to 11,000 cps at 7 1/2 ips; 40 to 7,000 cps at 3 3/4 ips.
POWER OUTPUT: 4 watts.
SIGNAL TO NOISE RATIO: 45 db.
"RECORD-PLAYBACK HEAD" and DOUBLE GAP ERASE HEAD: Have replaceable pole pieces.
RECORD LEVEL INDICATOR: Neon type.
INPUT JACKS: One for microphone or magnetic phono cartridge; one for radio, TV, and crystal or ceramic phono cartridge.
OUTPUT JACKS: One for external amplifier or headphone monitoring; one for external speaker.
TUBE COMPLEMENT: One each 6J7, 6SL7, 6X5, and 6V6.
POWER CONSUMPTION: 70 watts, full load.
DIMENSIONS: 14"W x 17"D x 11"H.
WEIGHT: 25 lbs.

Mechanical Specifications are the same as for TM-1 as mentioned above.

NL-1S Recorder

The NL-1S is the same as Model NL-1 except that it uses a stacked "stereo" head assembly and a "stereo" preamplifier.

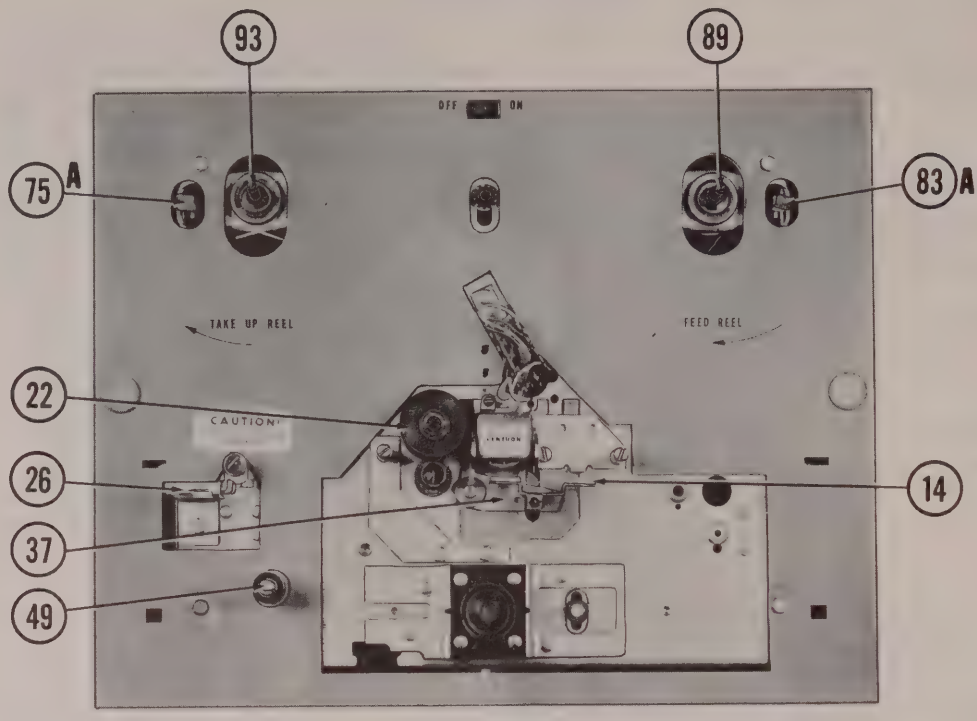
NL-2 Recorder

FREQUENCY RESPONSE: 40 to 13,000 cps at 7 1/2 ips; 40 to 7,000 cps at 3 3/4 ips.
POWER OUTPUT: 5 watts.
SIGNAL TO NOISE RATIO: 48 db.
"RECORD-PLAYBACK HEAD" and DOUBLE GAP ERASE HEAD: Have replaceable pole pieces.
RECORD LEVEL INDICATOR: Magic eye.
AUTOMATIC INDEX COUNTER.
INPUT JACKS: One for microphone or magnetic phono cartridge; one for radio, TV, and crystal or ceramic phono cartridge.
OUTPUT JACKS: One for external amplifier or headphone monitoring; one for external speaker.
TUBE COMPLEMENT: One each 6J7, 6SL7, 6X5, 6V6, and 6E5.
POWER CONSUMPTION: 80 watts, full load.
DIMENSIONS: 14"W x 16 3/4"D x 10 3/4"H.
WEIGHT: 29 lbs.

Mechanical Specifications are the same as for TM-1, as mentioned above.

NL-2S Recorder

The NL-2S is the same as Model NL-2 except that it uses a stacked "stereo" head assembly and a "stereo" preamplifier.



Later Production TM-1 Models Are Equipped with Record-Play and Double Gap Erase Heads.

Figure 1. Top View Of TM-1 With Escutcheons Removed.

NL-3 Recorder

FREQUENCY RESPONSE: 40 to 15,000 cps at 7 1/2 ips; 40 to 7,500 cps at 3 3/4 ips.
POWER OUTPUT: 10 watts, push-pull.
SIGNAL TO NOISE RATIO: 50 db.
"RECORD-PLAYBACK HEAD" and DOUBLE GAP ERASE HEAD: Have replaceable pole pieces.
RECORD LEVEL INDICATOR: Illuminated VU meter.
AUTOMATIC INDEX COUNTER.
INPUT JACKS: One for microphone or magnetic phono cartridge; one for radio, TV, and crystal or ceramic phono cartridge.
OUTPUT JACKS: One for external amplifier or head phone monitoring; one for external speaker.
TUBE COMPLEMENT: One each 6J7, 6SL7, 6X5, 6V6, 12AU7, & two 6AQ5's.
POWER CONSUMPTION: 110 watts, full load.
DIMENSIONS: 17 1/8"W x 17 3/4"D x 11"H.
WEIGHT: 35 lbs.

NL-3S Recorder

The NL-3S is the same as Model NL-3 except that it uses a stacked "stereo" head assembly and a "stereo" preamplifier.

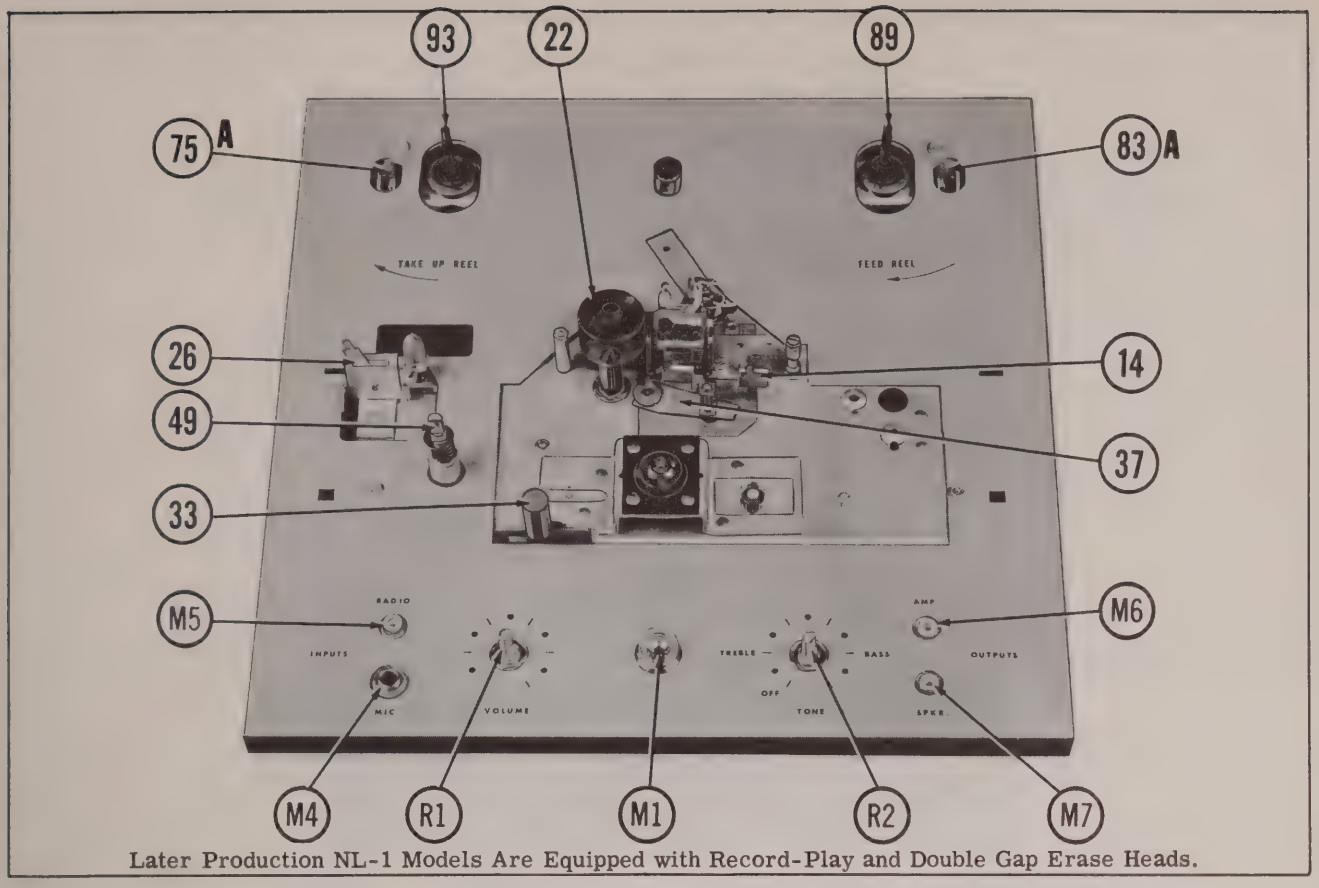
FUNCTIONS OF CONTROLS, INDICATORS, AND SWITCHES

Speed Control

Tape speed is controlled by moving the Speed Control Lever (26) either to the right or left. When the lever is in the right hand position the tape speed will be 7 1/2 ips. When it is in the left hand position the speed will be 3 3/4 ips. Change of speeds should be made only when the Rotary Control (3) is in the neutral position.

The mechanical action during a speed-change operation is as follows: A notch in the Speed Control Lever (26) engages the Speed Control Sector (25) so that when the Speed Control Lever is moved either to the left or right, the Speed Control Sector and the attached Shaft (67) or (69) are moved up or down, accordingly. The Idler Wheel (94) and Idler Bracket Sub Assembly (95) are attached to the shaft assembly and move up or down with it, thus allowing the Idler Wheel (94) to contact one or the other of the two steps on the Motor Pulley (99). When the Speed Control Lever (26) is in the left hand position the Idler Wheel (94) is in the up position and contacts the smaller step of the Motor Pulley (99). A tape speed of 3 3/4 ips results. When the Speed Control Lever (26) is in the right hand position the Idler Wheel (94) is in the down position and contacts the larger step of the Motor Pulley (99). This results in a tape speed of 7 1/2 ips.

When the Speed Control Lever (26) is moved to the right to select a tape speed of 7 1/2 ips, the downward movement of the Speed Change Shaft (69) causes the Speed Equalization Switch (M3 on Model NL-2 and M7 on Model NL-3) to open in order to obtain correct equalization for the 7 1/2 ips speed.



Later Production NL-1 Models Are Equipped with Record-Play and Double Gap Erase Heads.

Figure 2. Top View Of NL-1 With Escutcheons Removed.

Rotary Control

The Rotary Control (3) governs the mechanical operation of the transport mechanism. When the Rotary Control is turned to the left, or in a counter-clockwise direction from the neutral position, the mechanism is placed in Fast Forward operation. When the control is turned in a clockwise direction from neutral the mechanism is placed in Fast Rewind operation. To place the mechanism in Play or Record operation the Rotary Control is pressed downwards from neutral and turned to the right.

CAUTION: Do not attempt to turn the control to the left while it is depressed.

The idler wheel is automatically disengaged when the rotary control is in neutral position.

Action of the Rotary Control Shaft Assembly (49) can be considered under two conditions; (1) with Rotary Control not depressed, and (2) with Rotary Control depressed. Under the first condition a stud in the upper surface of the assembly engages a slot in the Wind and Rewind Slide Plate (47). When the Rotary Control is turned to the right for Rewind operation the Slide Plate (47) is moved to the left by the action of the stud. As the Slide Plate moves, a shaped slot which engages one end of the Tie Bar Assembly (64) causes the Tie Bar to move back, pushing against the Equalizer Bar (88) and thus tightening the Feed Belt (101). The sliding action of the Slide Plate also moves the Idler Release Lever Assembly (48) by means of a stud in the same assembly (48) which engages another slot in the Slide Plate (47). This movement of the Idler Release Lever Assembly allows the Idler Spring (91) to pull the Idler Wheel (94) into contact with the Motor Pulley (99) thus driving the Flywheel (76), the Feed Belt (101), and the Feed Reel Spindle (89).

A third effect of the movement of the Wind and Rewind Slide Plate (47) is the application or release of the reel brakes. When the Rotary Control is in the neutral position the bottom stud on the Control Ball (40A) is in a vertical position and the stud end projects through slots in the Slide Plate (47) and the Play and Record Control Cam (42), and fits into a dimple or depression in the Control Spring Plate Assembly (65). The cross arm of this assembly (65) bears against the Brake Arm Adjustment Screws (77) and (77A), applying pressure to the brake arms, which in turn hold the brake shoes against the reel seats. As the Wind and and Rewind Slide Plate moves to the left for Rewind operation it pulls the control ball stud out of the dimple so that the Control Spring Plate moves up and releases the brakes. When the Rotary Control (3) is returned to neutral a reverse action takes place and the brakes are reapplied. The action of the control ball stud is such that the brakes are applied first to the reel from which tape is being removed, thus preventing any over run tape spilling.

When the Rotary Control (3) is turned to the left for Fast Forward operation, the Wind and Rewind Slide Plate (47) moves to the right and causes the Tie Bar (64) to pull the Equalizer Bar (88). This tightens the Take-up Belt (97) on the Take-up Pulley (98) and the Belt Pulley (100), and forces the outer surface of the

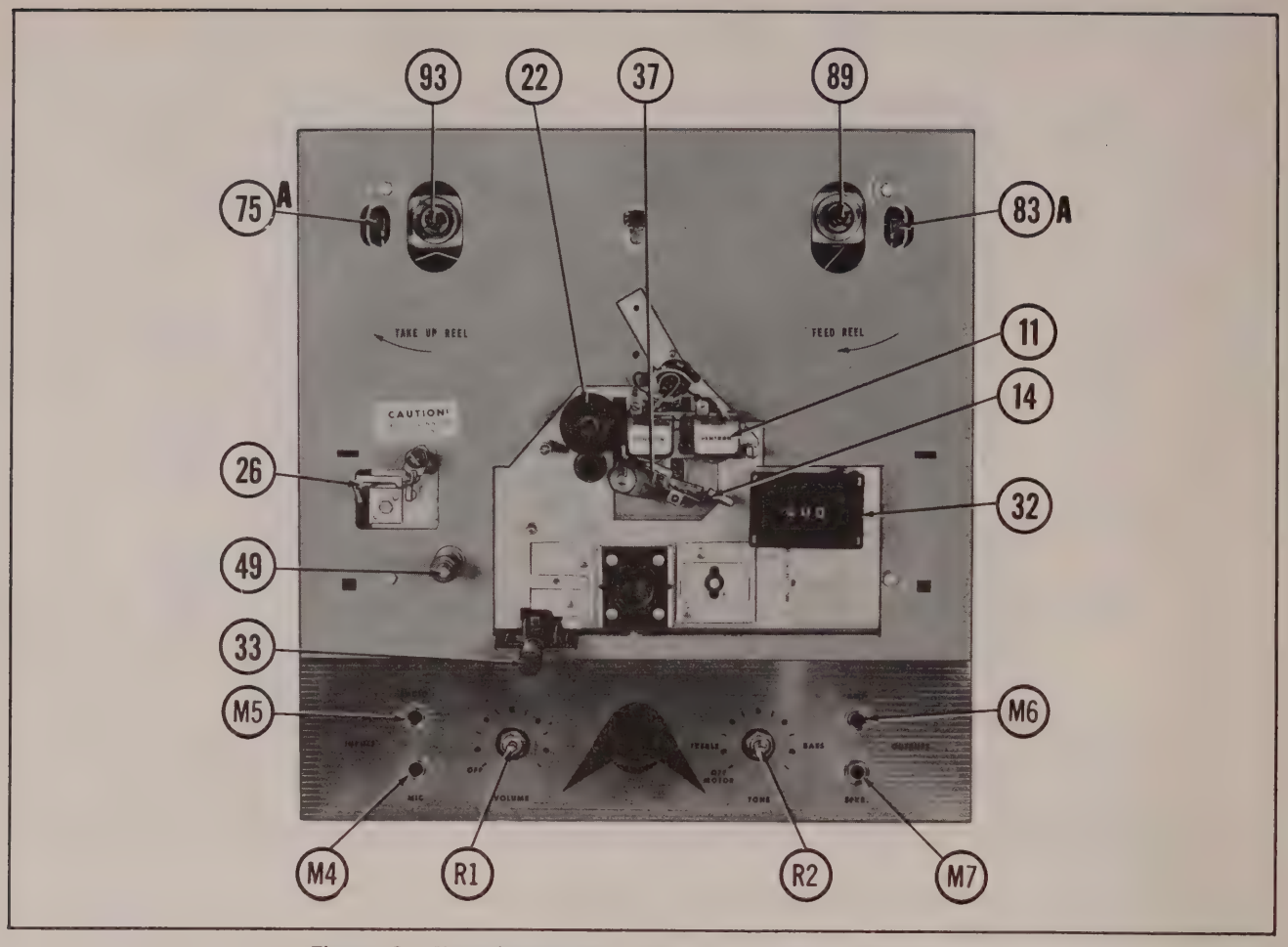


Figure 3. Top View Of NL-2 With Escutcheons Removed.

belt against the Motor Pulley (99). Rotation of the Motor Pulley then drives the Take-up Reel at fast forward speed. The brakes are released by the movement of the Slide Plate (47) but the Control Ball Stud (40A) is moved to the right instead of to the left as during Rewind operation. When the Rotary Control is returned to Neutral the brakes are reapplied first to the Feed Reel, thus preventing over run and tape spilling.

For the second mode of operation the Rotary Control (3) is depressed before being rotated. Rotation is then limited to clockwise direction, for playback or recording. As the Rotary Control is depressed the upper stud is disengaged from the Wind and Rewind Slide Plate (47) and a stud on the bottom of the Control Shaft assembly engages a slot in the Play and Record Control Cam (42). As the Rotary Control (3) turns, the Record Control Cam (42) rotates about a pivot, acting on three other parts at the same time. One arm of the Cam (42) moves the control ball stud to release the brakes and the other arm frees the Slide Plate Assembly (43) and pushes against the Rocker Arm (41). The Slide Plate Assembly moves in a direction to bring the Pressure Roller (22) against the Capstan to drive the tape. The Rocker Arm pivots and actuates the Idler Release Lever Assembly (48). Movement of the Slide Plate Assembly (43) also frees the Pressure Arm Lever (44) which in turn is moved by its spring (46) to bring the Pressure Plate and Pad Assembly (14) to bear against the Head assembly (11) or (12).

A third effect of movement of the Slide Plate Assembly is to free the Takeup Adjusting Lever Assembly (61) for rotation. Takeup Pressure Spring (57) actuates the Lever (61), forcing Takeup Adjusting Lever (54) against the Equalizer Bar (88) for correct takeup tension of Takeup Belt (97).

When the Rotary Control (3) is returned to Neutral a reverse action of all these parts occurs, but the brakes are applied equally to both reels since neither is turning at any great speed and danger of tape spilling is slight.

Volume Control (Model NL-1)

Turning the VOLUME control clockwise increases the volume level for both recording and playback.

Volume Control (Models NL-2 & NL-3)

Turning the VOLUME control clockwise increases the volume level for both recording and playback. The first few degrees of rotation operate the amplifier OFF switch.

Tone Control (Model NL-1)

The TONE control varies the relative strength of the bass and treble frequencies during playback, but has no effect on the tone while recording. The first few degrees of rotation operate the OFF switch which controls both the motor and amplifier.

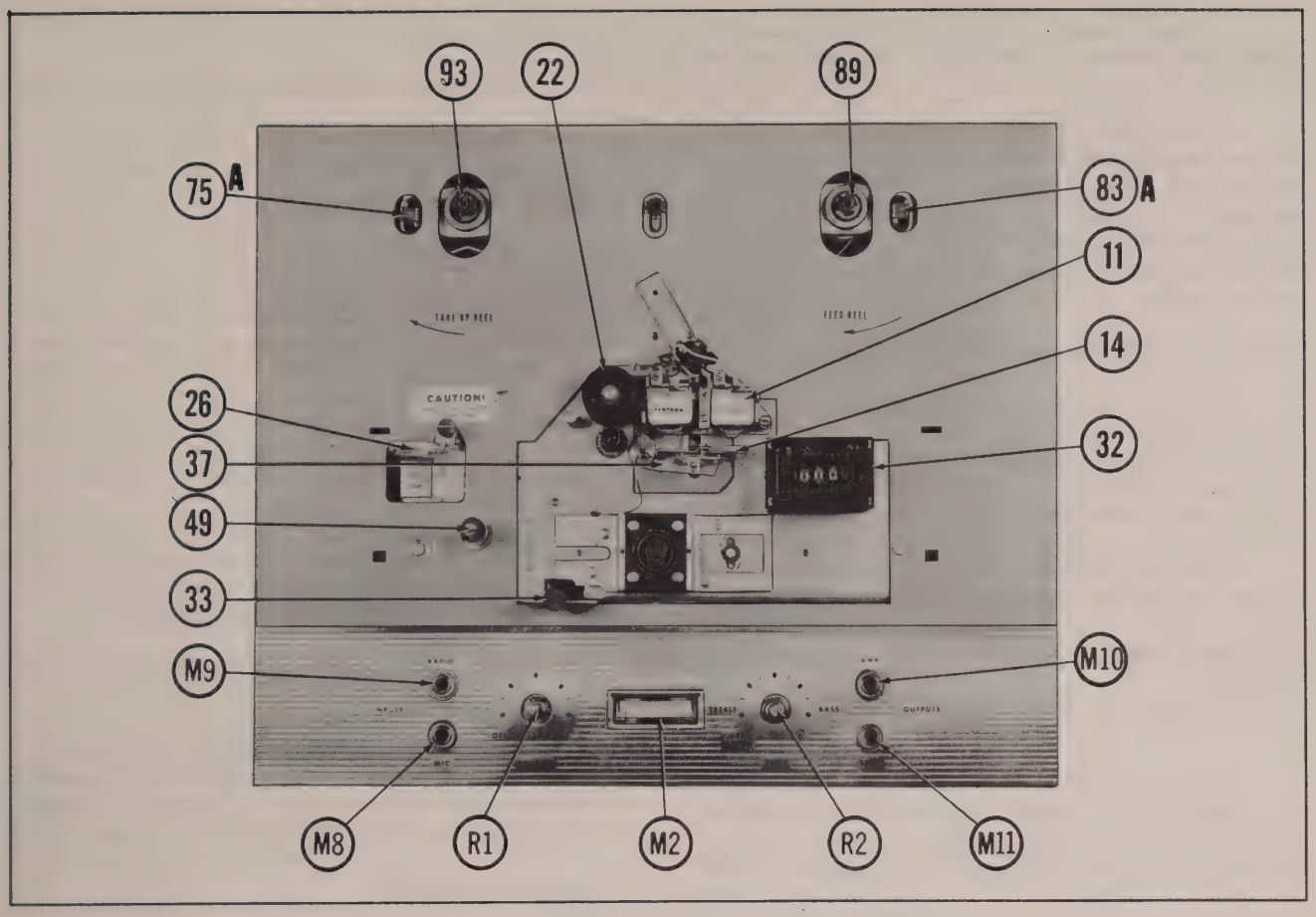


Figure 4. Top View Of NL-3 With Escutcheons Removed.

Tone Control (Models NL-2 & NL-3)

The TONE control varies the relative strength of the bass and treble frequencies during playback, but has no effect on the tone while recording. The first few degrees of rotation operate the MOTOR OFF switch.

Record Lock Button

Depressing the Record Lock Button (33) places the recording circuits into operation. If the Rotary Control is then depressed and rotated to the record position, the Record Lock Button will be held in recording position and recording proceeds until the Rotary Control is returned to neutral. This automatically releases the Record Lock Button.

Automatic Index Counter

The Automatic Index Counter (32) provides a means for locating recorded material anywhere on the tape. The counter is used on Models NL-2 and NL-3. Set the counter to zero at the beginning of a reel by rotating the reset knob. The counter is driven by means of a Flexible Shaft (103) connected to the Feed Reel Spindle (89).

Automatic Shut-Off Switch (Early Versions)

The Automatic Shut-Off Switch is located between the erase and playback heads on Model NL-3. When tape is properly threaded it falls between the contacts of this switch. Thus, when the end of a reel of tape is reached, or, in the event of tape breakage, the contacts will close.

The switch contacts of relay (M5) are in series with the motor circuit and are held closed by current through M5. The Shut-Off Switch is in parallel with the windings of relay (M5) so that when the Shut-Off Switch closes at the end of a reel it shorts across the relay windings and the relay switch opens, breaking the drive motor circuit.

Automatic Shut-Off Switch (Late Versions)

The Automatic Shut-Off Switch is located to the left of the play-record and erase head assembly on Model NL-3. When tape is properly threaded it falls between the metal post and the switch arm finger. Thus, when the end of a reel of tape is reached, or, in the event of tape breakage, the metal finger is allowed to move into the metal post, opening the switch which breaks the motor circuit.

OPERATING INSTRUCTIONS

Tape Loading And Threading

1. Place a reel of tape on the right hand (supply) spindle so that the reel will turn clockwise when tape is pulled from the reel. Use "A" wind tape — that is, tape that is wound coated side inwards. "B" wind tape can be easily changed to "A" wind by giving the tape a half twist before threading, and running the tape through Fast Forward or Rewind operation.

2. Place an empty reel on the left hand (take-up) spindle. Make sure that both reels are properly seated on the reel rests.

3. Reel out a convenient length of tape and hold a section straight with both hands. Drop this section into the tape slot and thread the free end of the tape into one of the slots in the hub of the take-up reel. Turn the reel by hand until several turns have secured the tape to the reel and all slack has been taken up between reels.

To Turn On Amplifier And Motor

Prepare to record or playback by turning "Volume-On-Off" Control to the "on" position. On Model NL-1 this control also turns on the drive Motor, but on Models NL-2 and NL-3 the motor switch on the "Tone" control must also be turned to the "on" position.

Allow the amplifier to warm up for about 30 seconds before proceeding to record or playback.

To Record From Microphone

1. Insert the microphone plug into the "Mic" jack.

2. Set the record level. This can be done before tape movement is started by holding down the Record Lock Button and adjusting the Volume control for proper response from the indicator. The proper volume levels are as follows:

(a) Model NL-1 (Neon Bulb) — Adjust the volume level so that the loudest portions of the signal cause the lamp to flash intermittently.

(b) Model NL-2 (Magic Eye) — Adjust the volume level so that the loudest portions of the signal just cause the eye to close.

(c) Model NL-3 (VU Meter) — Adjust the volume level so that the peaks of meter deflection do not go past zero, or into the red area of dial calibration.

3. Hold the Record Lock Button down and turn the Rotary Control to the right, thus starting the recorder in motion. When through recording, turn the Rotary Control to neutral. The Record Lock Button will automatically release and deactivate the record circuit.

To Record From Radio, TV, Or Phonograph

1. Connect the output signal from the radio, tuner, TV, or phonograph to the "Radio" input jack of the recorder.

2. Proceed as under "To Record From Microphone", step 2.

To Play A Recording

1. Depress Rotary Control and turn it to the right.

2. Adjust "Volume" and "Tone" controls for desired listening quality.

Dual Track Recording

These recorders are designed so that only one-half the tape width is recorded at a time, thereby resulting in dual-track recording. To make a dual-track recording proceed as follows:

1. After a reel of tape has been recorded, i.e. all the tape wound onto the take-up reel, place the Rotary Control in neutral position.

2. Remove the reels from the recorder, turn the full reel over and place it on the right-hand spindle. Place the empty reel on the left-hand spindle.

3. Thread the tape and proceed with the recording.

4. After the second track has been recorded the first track can be played, without rewinding, by trading reels on the spindles as in step 2, rethreading the tape and placing the recorder in Playback operation.

To Erase Recordings

These recorders automatically erase previous recordings as new recordings are being made. If it is desired to erase without recording new material, set all controls as if recording but do not plug in the microphone or other program source, and run the tape through the machine. For best results, set Volume Control at zero.

To Use An External Speaker

Plug the external speaker into the jack marked "SPKR". On Models NL-2 and NL-3 this automatically disconnects the internal speakers. On Model NL-1 plugging in an external speaker places it in parallel with the internal speaker.

To Use An External Amplifier

Connect the recorder jack marked "AMP" to the input of the external amplifier. This input should be one designed to accept a high level signal requiring no further equalization for flat playback response.

To Use As A P.A. System

Any of the Model NL-1, NL-2, or NL-3 recorders can be used as a public address system by plugging a microphone into the RADIO input jack.

MECHANICAL ADJUSTMENTS

Equalizer Bar Adjustment

This adjustment is made by loosening Socket Head Screw (27) and shifting the Equalizer Bar (88) forward or backward. Make the adjustment as follows:

First, remove the Spindle Caps (1) and Reel Rests (2). With the Rotary Control (3) in neutral position, move the Equalizer Bar (88) to a position such that the Take-Up Spindle (93) is on the verge of spinning without any pressure being exerted on the Equalizer Bar (88)

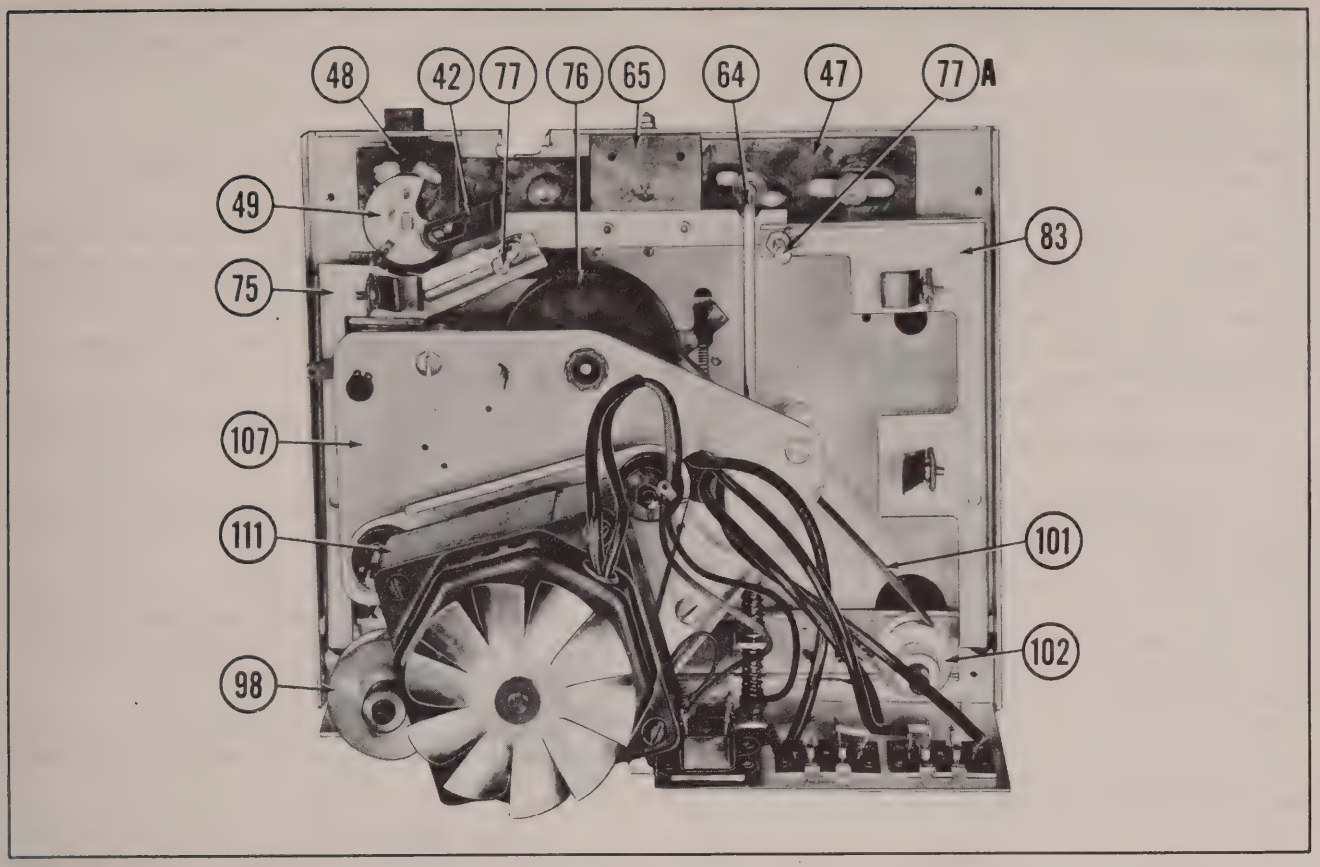


Figure 5. Bottom View Of TM-1 Mechanism.

from the Tie Bar (64). After adjustment is made be sure the socket head screw (27) is tightened securely. The Equalizer Bar Adjustment Screws (77B) are adjusted by turning both screws down until they hit the mechanism plate. Then back the screws off 1/4 turn and lock them down with Lock Nuts (78B). This adjustment acts as a stabilizer for the equalizer bar.

Tie Bar Pressure Adjustment

The amount of pressure exerted on the Equalizer Bar (88), by means of the Tie Bar (64), is adjusted by movement of the Elastic Stop Nuts (79). The elastic stop nuts should be adjusted so as to allow the Forward and Rewind positions on the Rotary Control to function freely and still exert enough pressure on the equalizer bar for adequate Forward and Rewind performance. To determine if performance is adequate test the Rewind with a full 7" reel on the feed side. To test for Wind place the full 7" reel on the take-up side.

NOTE: The Tie Bar (64) must be readjusted whenever the Equalizer Bar (88) is adjusted.

Takeup Adjustment

This adjustment is accomplished by bending the Take-Up Pressure Spring (54). Bending the spring closer to the Equalizer Bar (88) increases the pressure on the equalizer bar thus giving a stronger take-up. Bending the spring away from the equalizer bar gives a weaker take-up. If bending the spring does not give adequate results, loosen the screw which mounts the spring and move the spring in the proper direction for optimum adjustment.

Brake Adjustment

After equalizer bar adjustments have been made the brakes are ready to be adjusted. First put a full 5" reel of tape on the feed reel side, and an empty 7" reel on the take-up side. Wind about 1/4 of the tape on to the 7" reel. While operating the Rotary Control from "Rewind" to "Neutral", tighten the Left Brake Adjusting Screw (77) until the reels stop in about 1 revolution without spilling tape. Next, reverse the procedure by placing the 5" reel of tape on the take-up side and the empty 7" reel on the feed side. Adjust the Right Brake Adjusting Screw (77A) so that the reels stop in "Fast Forward" to Neutral" in about 1 revolution. Next put a full 7" reel of tape on the feed side and an empty 7" reel on the take-up side. Run about 100' of tape on to the take-up reel, then go directly into "Rewind". When the take-up reel is almost empty, place the Rotary Control in "Neutral". The reels should stop in about 3 or 4 revolutions without spilling tape. Next, reverse the procedure by placing the full 7" reel on the take-up side and rewind about 100' of tape on the feed reel. Go directly into "Fast Forward" until the feed reel is almost empty. Then place the Rotary Control in "Neutral". The reels should stop in about 3 or 4 revolutions without spilling tape. After the brakes are adjusted, check the take-up and rewind. If the take-up or rewind has been affected, readjust. If it is difficult to get adequate take-up, the brakes may have been adjusted too tightly. Readjust the brakes to rectify this condition.

Idler And Speed Change Adjustment (Models NL-2 & NL-3)

Loosen the set screw and nut which secures the Speed Change Shaft (69) to Idler Channel (70). Adjust the position of idler channel assembly so that the full perimeter of the Idler Wheel (94) rides on the perimeter of the Motor Pulley (99). The idler wheel should not ride on the edge of the motor pulley. After the idler channel has been positioned correctly in a vertical direction on the speed change shaft, check to see that the shaft has not rotated so that the speed change sector no longer engages the slot in the Speed Shift Lever (26). If necessary loosen the Speed Change Shaft Knob (24) and reposition the Speed Change Sector (25).

Play-Record Head Alignment

The Play-Record Head is correctly aligned for azimuth when the magnetic gap is at an exact right angle with the direction of tape travel. One of the best ways for making an azimuth adjustment is by means of an alignment tape and a meter. A substitute method would be to play back a recording and adjust the head for maximum high frequency content in the output, as judged by ear. The use of alignment tape and meter is as follows:

1. Connect the meter to the "AMP" output jack and set it for a low AC voltage range.

2. Loosen the record head mounting screw just the slightest amount, so that the head may pivot about this screw as a center, but cannot slip up or down vertically.

3. Play the alignment tape and adjust the Azmur-X spring loaded screw for maximum output on the meter.

4. Check to see that the height of the head has not been disturbed. The center line of the head and pole piece must be lined up so that the pole piece is at the same level as the tape guides and tape.

5. Tighten the head mounting screw and seal the Axmur-X adjustment screw with a small amount of household cement.

Record Level Indicator Adjustment (Model NL-1)

The neon lamp on your tape recorder indicates the maximum undistorted recording level, and although set at the factory, it may require a minor adjustment.

When this becomes necessary, the following adjustment procedure is suggested.

1. Allow the recorder to thoroughly warm up. (usually about 5 minutes).

2. Insert a thin screwdriver through the "AMP" jack hole.

3. Set the volume control at approximately 2 o'clock and make a normal recording holding the microphone 4" to 6" from the mouth. Speak into the microphone at a normal conversational level.

4. Slowly turn the screwdriver until the neon bulb just flickers at the peak or loud portions of your voice.

To check the above setting, playback the recording to see that the level of playback is entirely adequate and not distorted at normal listening levels.

If playback is weak, repeat step 4 but slightly increase the volume control.

If playback is loud and distorted, repeat step 4 but slightly decrease the volume control.

Depending on the individual's voice the above procedure may have to be repeated several times before the desired recording level is obtained.

PARTS REPLACEMENT

How To Replace A Pole Piece

Remove the head assembly by loosening the mounting screws which hold down the assembly. The pole piece is then removed by inserting a non-magnetic screw driver between the head can and the pole piece and prying the pole piece by breaking the glue joint. The new pole piece is then inserted between the two laminations provided for each leg of the pole piece. After the pole piece is in position it should be cemented from the sides with household cement. The head assembly is then screwed into place and the heads aligned.

How To Replace A Play-Record Head

Remove the #6-32 Phillips Oval Head Mounting screw (6) and the Head Cover Casting (5). This will give access to the heads. Unsolder the head leads at the head plug socket or at the terminal lugs. Loosen the Azmur-X adjustment screw and the head mounting screw (see Fig. 6). The head can now be replaced.

The head should be aligned for correct aximuth after replacement.

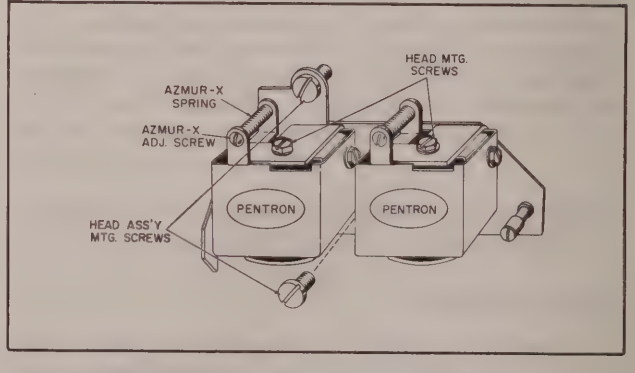


Figure 6. Head Adjustment Points.

How To Replace A Pressure Roller

Remove the #6-32 Phillips Oval Head Mounting Screw (6) and the Head Cover Casting (5). Remove the

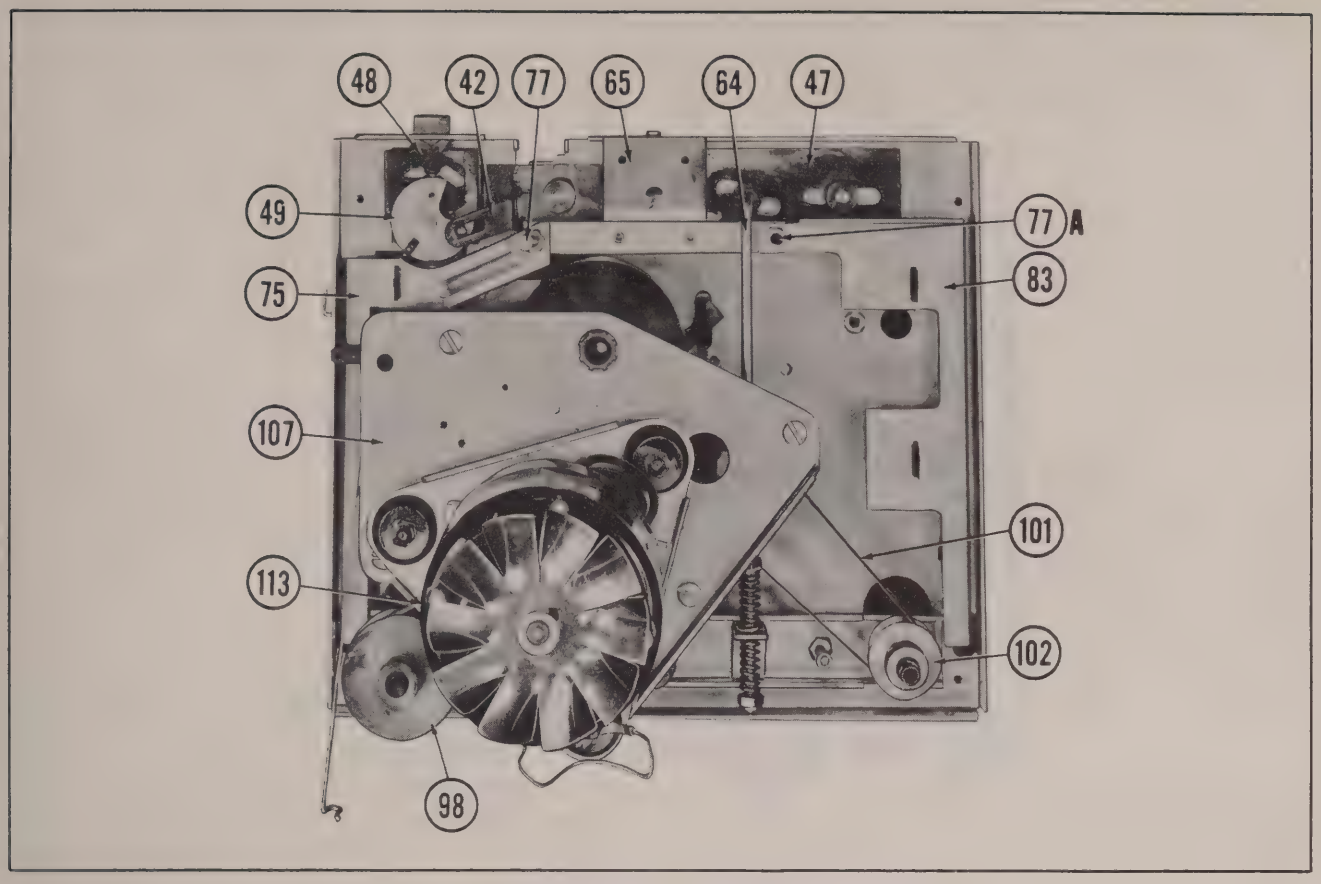


Figure 7. Bottom View Of NL-1 Mechanism.

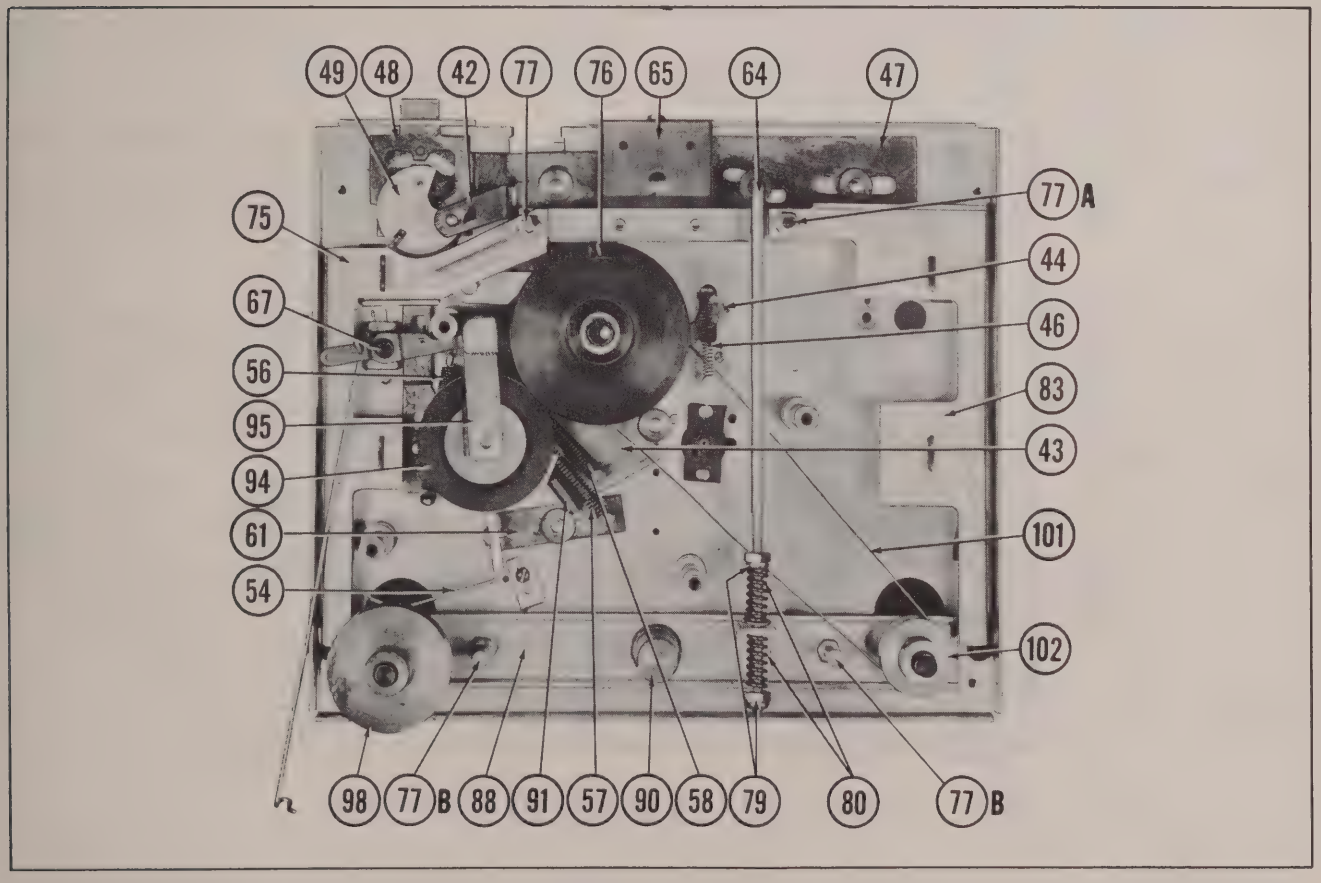


Figure 8. Bottom View Of NL-1 With Motor Mtg. Plate Removed.

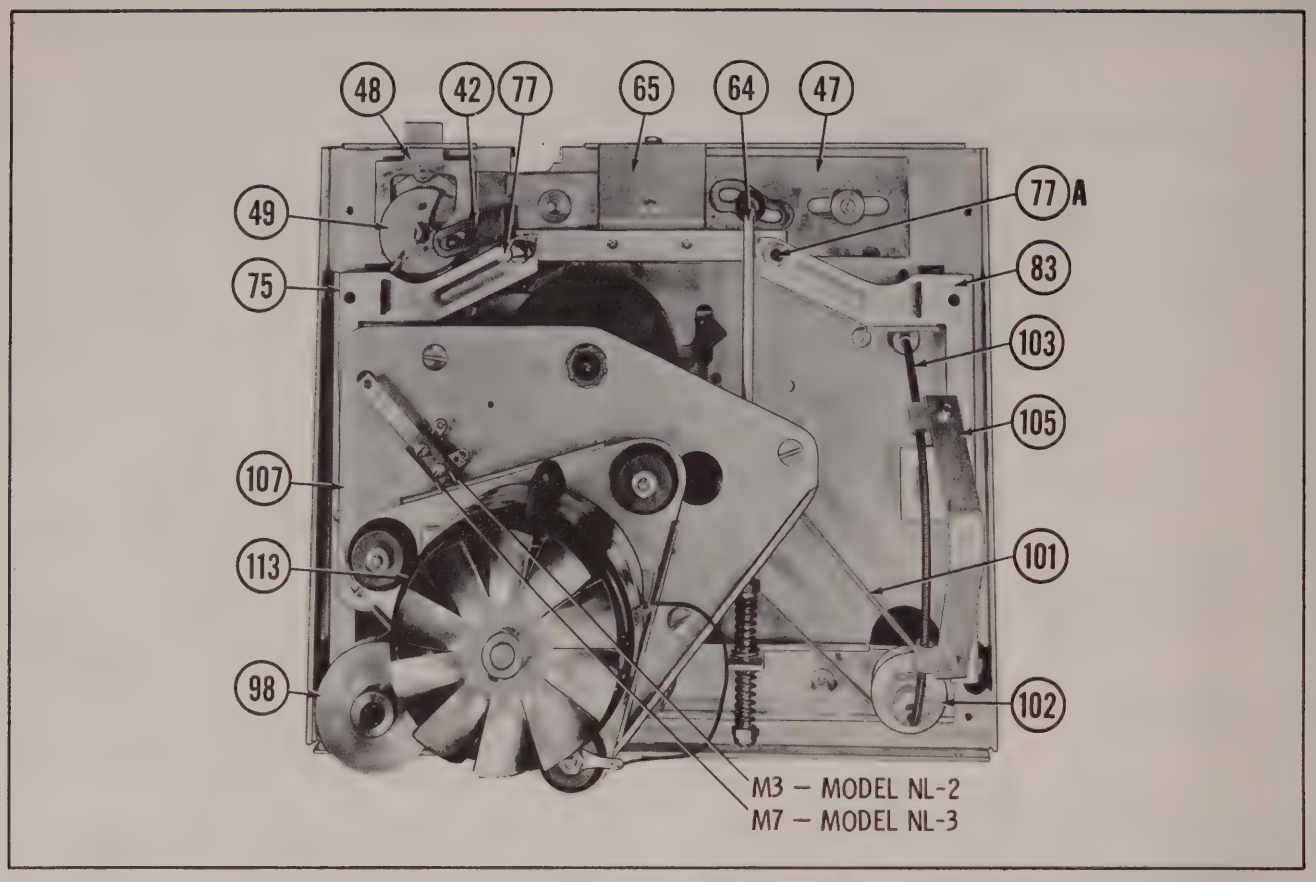


Figure 9. Bottom View Of NL-2 & NL-3 Mechanism.

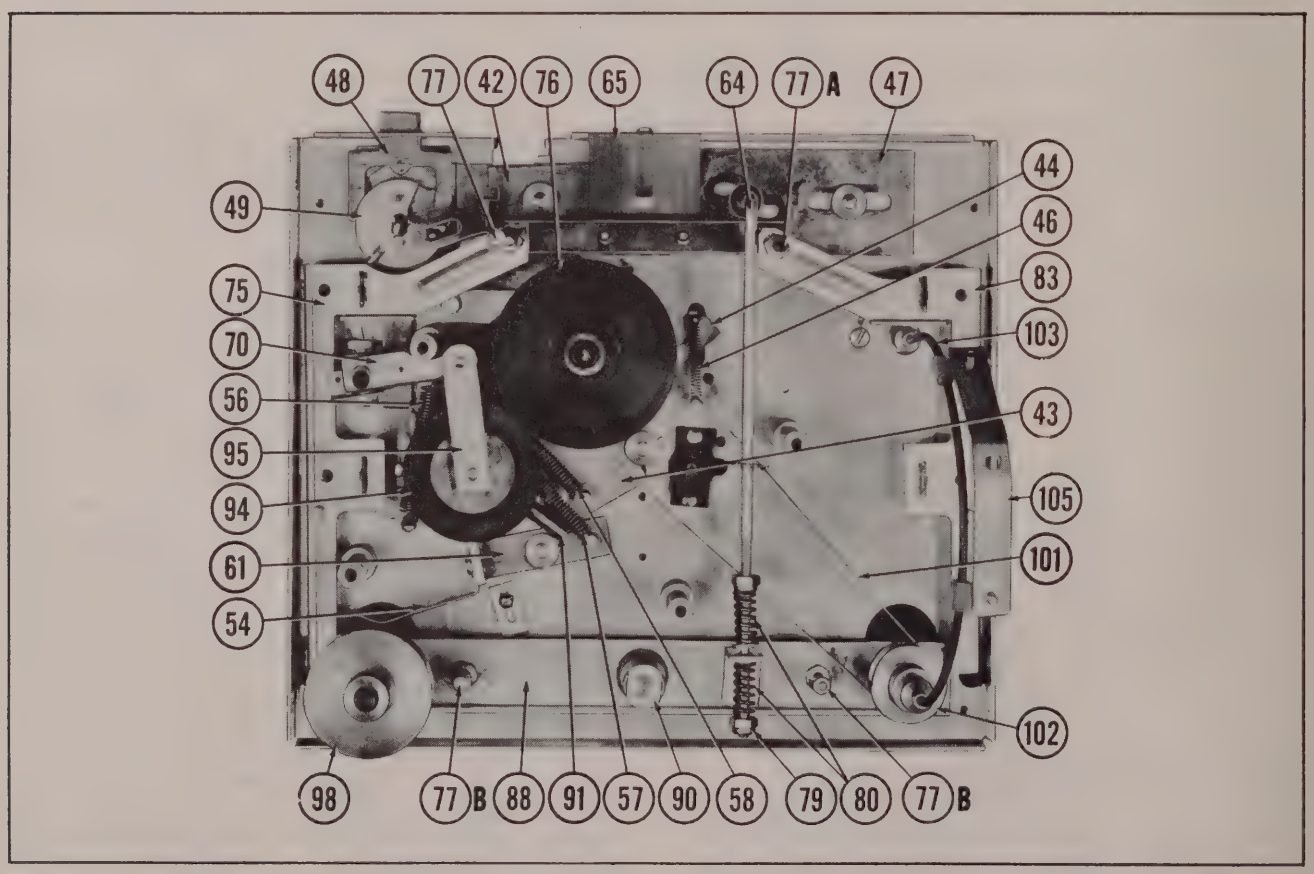


Figure 10. Bottom View Of NL-2 & NL-3 With Motor Mtg. Plate Removed.

crescent retaining ring (21) and lift off the pressure roller. Clean the pressure roller stud and clock steel washer (23) with a dry cloth. Apply grease to the inside bottom of the new pressure roller. Put the new pressure roller on the pressure roller stud and wipe off any excess grease at the top of the roller. Replace the crescent retaining ring. Do not get any grease on the driving surface of the pressure roller as this will hinder the operation of the machine.

How To Replace An Idler Wheel

Remove the Motor Support Plate (107) by taking out the 4 #10-32 machine screws (108). This will give access to the Idler Wheel. Slide the Idler Spring Clip (92) forward and slip it off the shaft, then remove the clock steel washer and the Idler wheel from the Idler stud. Clean the stud before installing a new Idler. Install idler wheel in reverse order, being careful not to get any grease on driving surface of wheel. Replace Motor Support plate.

How To Replace An Equalizer Bar

On Model TM-1 first remove the back plate containing output jacks and slide switch. Remove the Spindle Caps (1), Reel Rests (2) and Head Cover Casting (5). Loosen the set screws on feed and take-up pulleys. (Remove flexible shaft on feed reel spindle, Models NL-2 & NL-3). Lift out both reel spindles from top of unit and remove the elastic stop nut (79) and spacer (80) from the end of the Tie Bar (64). Remove socket head screw (27), Equalizer Pivot Stud (90), and Equalizer Spacer (87). Equalizer bar can then be removed and replaced. Clean all bearing surfaces and washers and lubricate properly before replacement of bar. After new bar is installed follow instructions for Equalizer Bar, Tie Bar, and Brake Adjustments.

How To Replace A Motor Assembly

Place Rotary Control (3) in Neutral position. Remove the 3 nuts (73) and washers which hold the Motor Plate to the rubber shock mounts. Lift motor off the three mounting studs. When replacing motor make sure that motor pulley (99) is outside the take up belt (97) as shown in the exploded view.

How To Replace A Take-Up Belt

The removal and replacement can probably be most easily accomplished if the back of the unit is facing up. Slip the belt off the take-up pulley (98) first. Start the belt up over the edge of pulley and assist the action by turning take up reel seat by hand. Then remove the belt from the Belt Pulley (100) by slipping the belt up through the clearance in the Motor Support Plate (107). Replacement is done in the reverse order. Make sure that the lettering is on the inside of belt then slip the belt over the Belt Pulley (100) by working it up through the clearance in the Motor Support Plate. Pull the belt around under the Motor Pulley (99) and work it up between the Motor Pulley and the motor mounting stud, towards the Take Up Pulley (98). Slip the belt over the Take Up Pulley. The Equalizer Bar and Tie Bar may require readjustment after the new belt is installed.

How To Replace A Feed Belt

Turn the unit upside down and remove the head leads and the flexible shaft. On Models NL-1, NL-2, and NL-3 the head leads can be unplugged but on the basic TM-1 mechanism they will need to be unsoldered. The flexible shaft is used on Models NL-2 and NL-3. The belt can now be removed from the feed pulley but the Motor Support Plate (107) must be removed before the belt can be taken off the Flywheel and Capstan Assembly (76). Remove the four #10-32 screws (108) and remove the Motor Support Plate. The Feed Belt can now be completely removed and replaced. Make sure that new belt is installed with lettering on the outside. Reassemble in reverse order, making sure that Motor Support Plate is properly seated on the studs.

LUBRICATION

Although this mechanism is prelubricated at the factory, replacement of parts requires that they be lubricated in order to insure proper functioning. No part needs more than a slight film of grease where grease is specified or one drop of oil where oil is specified.

The following parts require greasing with fibre grease or a similar compound:

1. Play-record cam (42).
2. Wind-rewind slide plate (47).
3. Control spring (65).
4. Control Ball shaft (40A), bottom end.
5. Slide plate assembly (47).
6. Pressure roller bearing, (22) and (37).
7. Belt pulley (100).
8. Tie bar (64), front end.
9. Idler wheel bearing (94).
10. Record lock (33).
11. Equalizer bar pivot stud (90).
12. Take-up adjusting lever (61).
13. Pressure arm lever (44).
14. Pressure finger carrier assembly (37).

The following parts require oiling with 10W lubricating oil:

1. Feed spindle assembly (89).
2. Take-up spindle assembly (93).
3. Flywheel assembly (76).

CAUTION: Do not clean oilite bearings with cleaning solvent. Oilite bearings are permanently oiled, but in some cases where the bearings appear dry a drop of oil will be necessary.

CLEANING

The recording and erase heads, the capstan (76), and the pressure roller (22) are subject to an accumulation of tape coating oxide which is worn off the tape as it passes these parts. Clean these parts with a soft cloth and alcohol after every ten hours of running time.

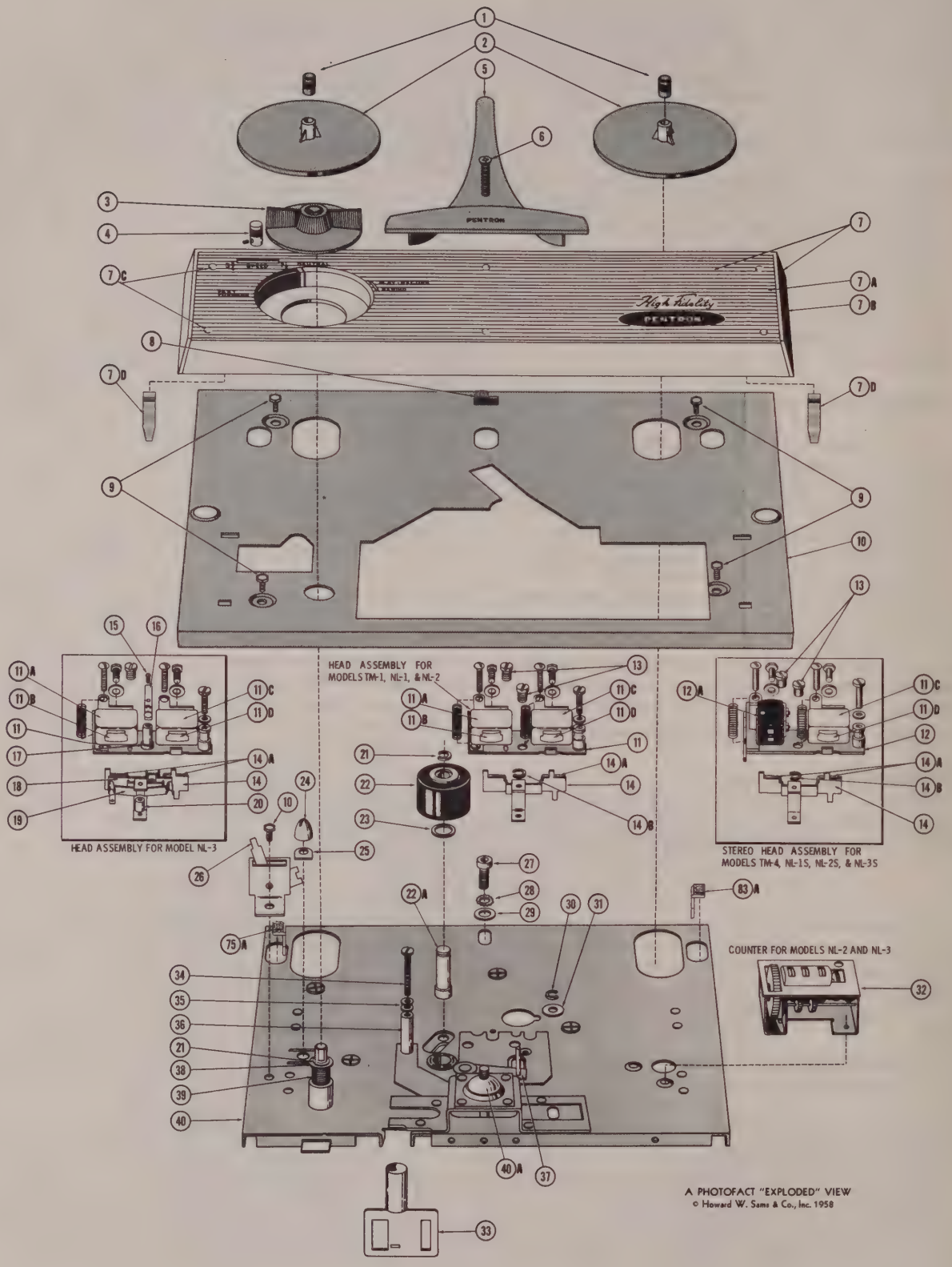

HEAD ASSEMBLY FOR MODELS TM-1, NL-1, & NL-2
HEAD ASSEMBLY FOR MODEL NL-3
STEREO HEAD ASSEMBLY FOR MODELS TM-4, NL-1S, NL-2S, & NL-3S
COUNTER FOR MODELS NL-2 AND NL-3
A PHOTOFACT "EXPLODED" VIEW
© Howard W. Sams & Co., Inc. 1958

Figure 11A. Exploded View Of Parts Above Mechanism Plate

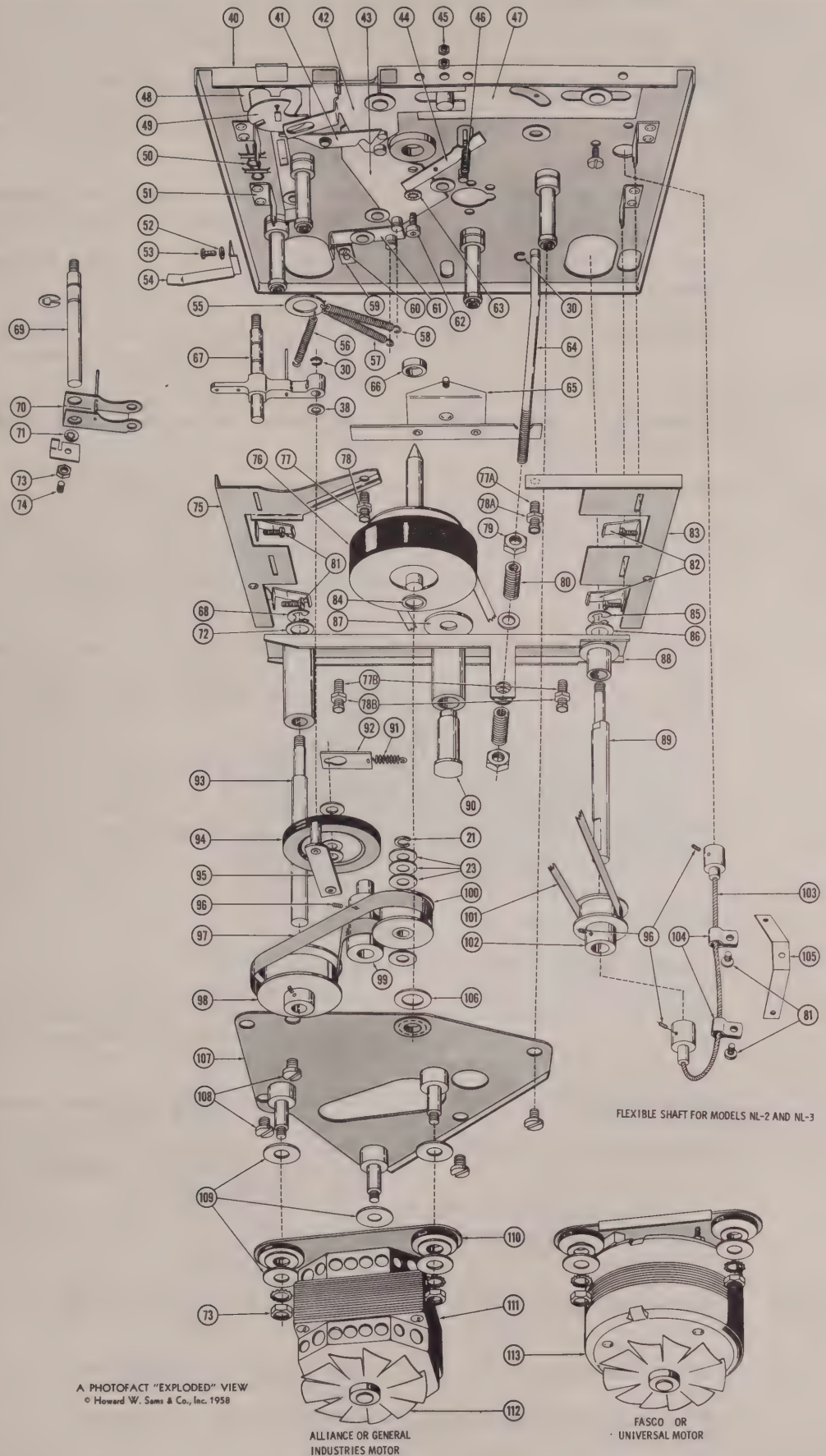

FLEXIBLE SHAFT FOR MODELS NL-2 AND NL-3
A PHOTOFACT "EXPLODED" VIEW
© Howard W. Sams & Co., Inc. 1958
ALLIANCE OR GENERAL
INDUSTRIES MOTOR
FASCO OR
UNIVERSAL MOTOR

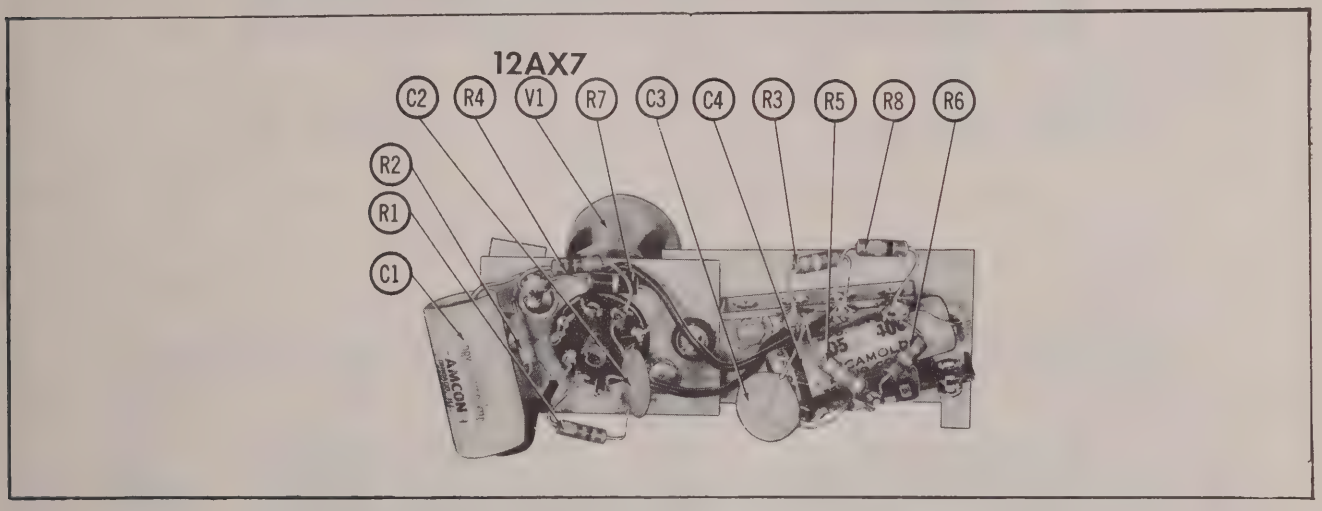
Figure 11B. Exploded View Of Parts Below Mechanism Plate

MECHANICAL TROUBLES AND PROBABLE REMEDIES

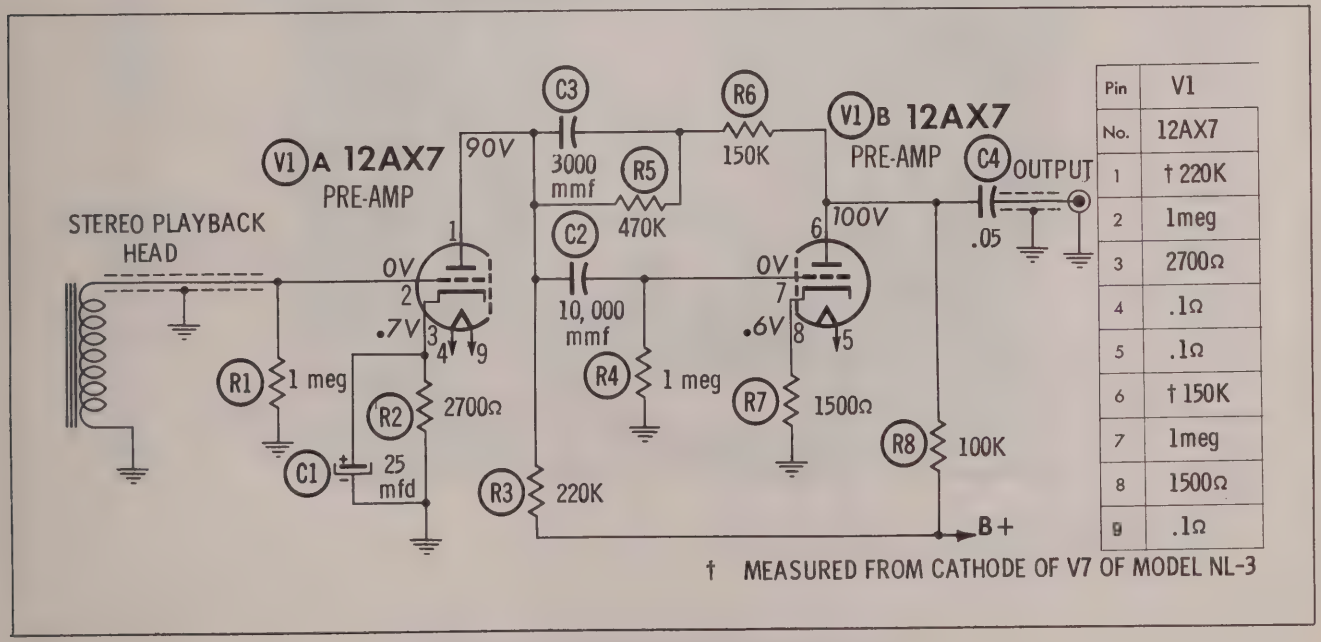
SYMPTOM	CAUSE	REMEDY
No rewind.	1.Glazed idler wheel (94).	1.Rub off glaze with a clean, dry, lint free cloth.
	2.Faulty tie bar (64) adjustment.	2.Adjust as described under "Tie Bar Pressure Adjustment".
	3.Idler wheel (94) slips against flywheel or motor pulley.	3.Clean idler wheel, flywheel, and motor pulley with alcohol. If idler wheel still slips, replace.
	4.Idler wheel (94) not adjusted properly.	4.Adjust as described under "Idler And Speed Change Adjustment".
	5.Binding feed reel spindle (89).	5.Remove "E" ring (85) and remove spindle from bearing. Clean bearing and spindle with a clean, soft cloth.
	6.Dragging brake linings. Brakes not adjusted properly.	6.Adjust brakes as described under "Brake Adjustment".
	7.Warped reel rest (2).	7.Replace reel rest.
	8.Feed belt (101) loose or broken.	8.Replace.
Flutter.	1.Motor pulley (99) not concentric to motor shaft.	1.Replace motor and pulley assembly.
	2.Excessive take-up.	2.Adjust as described under "Take-up Adjustment".
	3.Take-up belt (97) not installed properly.	3.Remove and replace belt as shown on "Exploded View".
	4.Dirty flywheel bearings.	4.Clean bearings and flywheel shaft with a clean, soft cloth.
Wow.	1.Foreign matter on idler wheel (94), motor pulley (99), flywheel (76), or take-up pulley (98).	1.Clean with a cloth and alcohol.
	2.Defective idler wheel (94).	2.Replace.
	3.Defective pressure roller (22).	3.Replace.
	4.Reel spindles (89) and (93) binding.	4.Remove "E" ring (85) on top of spindles and remove spindles from bearings. Clean bearings and spindles with a clean, soft cloth.
	5.Brakes improperly adjusted.	5.Adjust as described under "Brake Adjustment".
No Wind (Fast Forward).	1.Binding take-up spindle (93).	1.Remove "E" ring (85) on top of spindle and remove spindle from bearing. Clean bearing and spindle with a soft, clean cloth.
	2.Take-up belt (97) loose, twisted, or broken.	2.Replace belt.
Tape spillage or insufficient braking.	1.Faulty brake adjustment.	1.Adjust brakes as described under "Brake Adjustment".
	2.Worn brake linings.	2.Replace linings and readjust brakes.
	3.Worn out or loose control spring (65).	3.Adjust or replace control spring.
	4.Excessive play in equalizer bar (88).	4.Readjust equalizer bar as described under "Equalizer Bar Adjustments".

ELECTRICAL TROUBLES AND PROBABLE REMEDIES

SYMPTOM	CAUSE	REMEDY
Poor high frequency response.	1. Play-Record head improperly aligned	1. See "Play-Record Head Alignment".
	2. Worn pole piece on Play-Record head.	2. Replace pole piece and realign for azimuth.
No erase — distorted or weak record.	1. Bias-Erase oscillator not working.	1. Check oscillator tube and oscillator coil. Replace if necessary.
No erase — records on top of previous recording.	1. Defective erase head or circuits.	1. Check circuits — replace head if necessary.
Distorted recording — play-back function O.K.	1. Improper recording level.	1. Check operation of level indicator. Check setting of adjustment for level indicator (Model NL-1).
	2. Defective microphone.	2. Compare with microphone known to be good.



STEREO PREAMPLIFIER — BOTTOM VIEW



STEREO PREAMPLIFIER SCHEMATIC

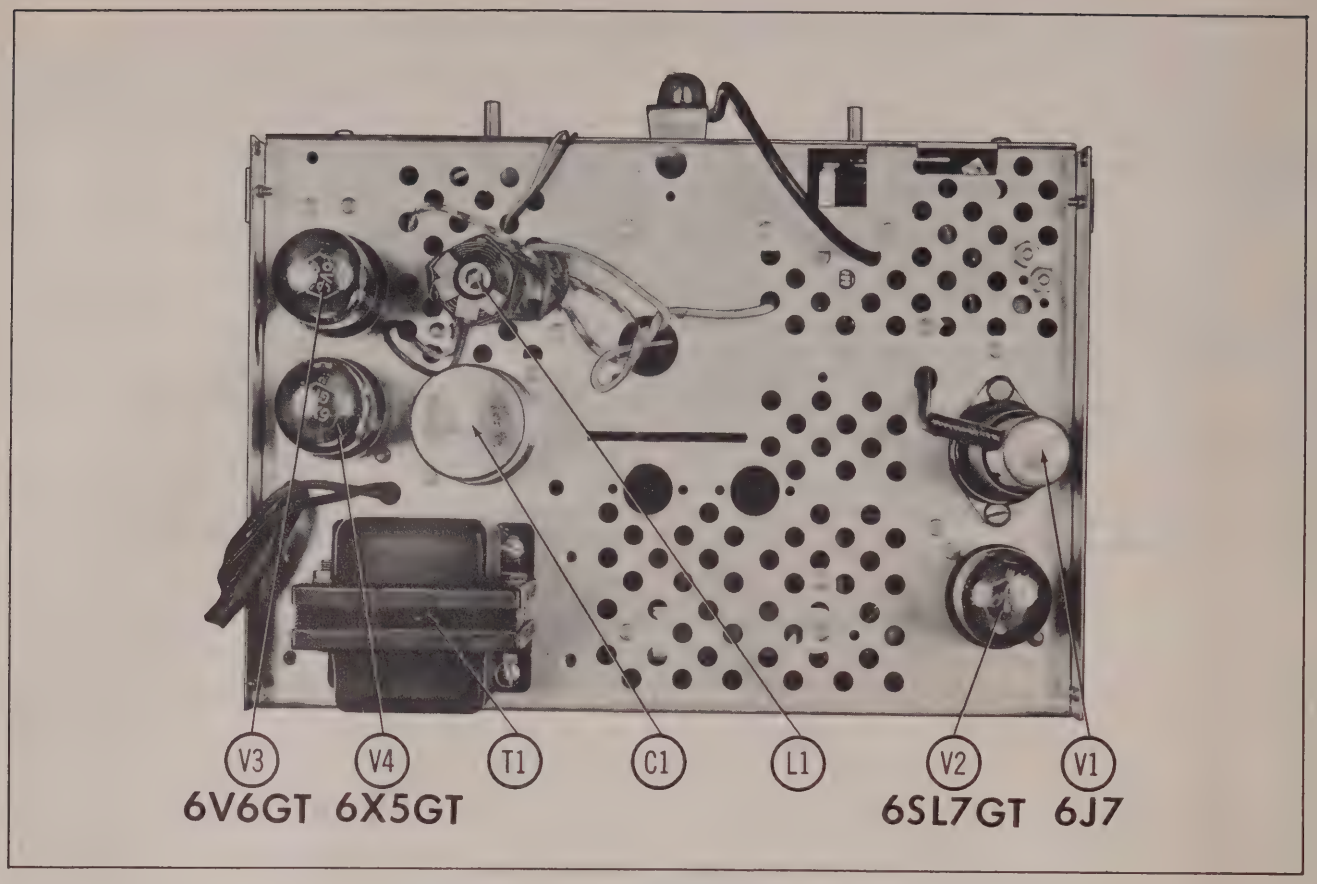


Figure 12. Rear View Of NL-1 Amplifier.

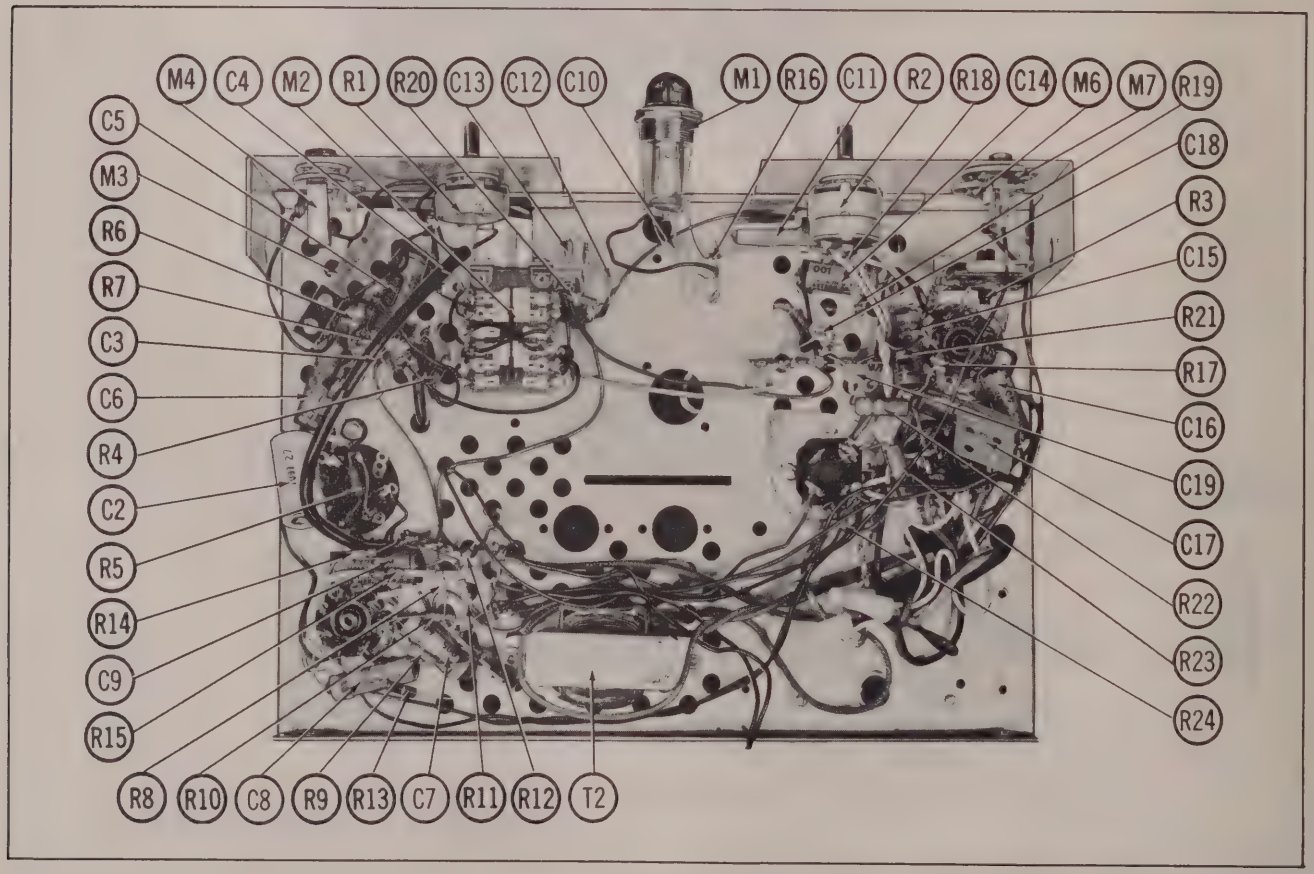


Figure 13. Front View Of NL-1 Amplifier.

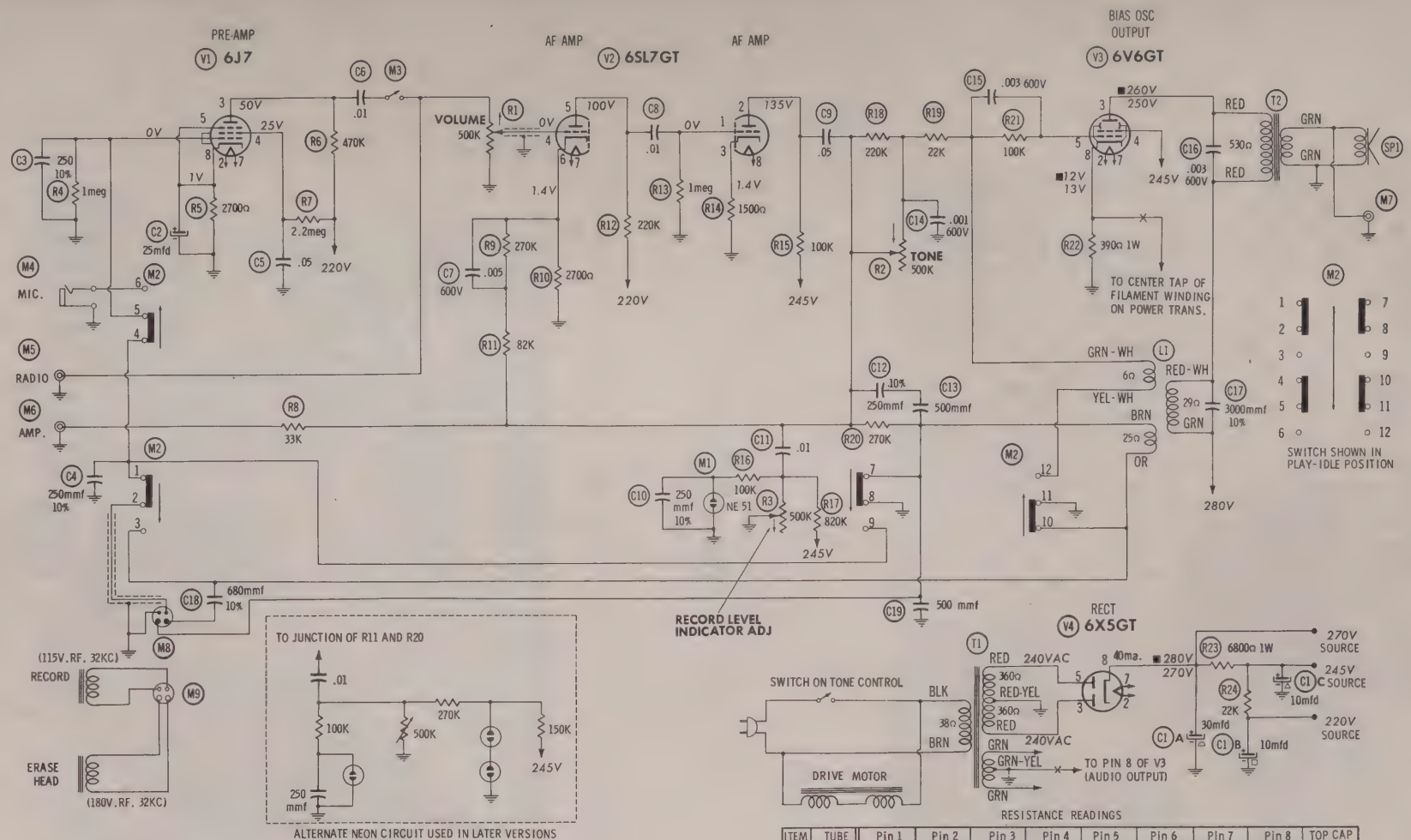


Figure 14. Schematic Diagram Of Model NL-1.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	TOP CAP
V1	6J7	TP	390Ω	†500K	†2.2meg	2700Ω	NC	390Ω	2700Ω	1meg
V2	6SL7GT	1meg	†100K	1500Ω	0Ω	†240K	2700Ω	390Ω	390Ω	
V3	6V6GT	NC	390Ω	†560Ω	†6800Ω	270K ■100K	TP	390Ω	390Ω	
V4	6X5GT	TP	390Ω	360Ω	TP	560Ω	TP	390Ω	¶	

ALL MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED
† MEASURED FROM PIN 8 OF V4
■ MEASURED IN "RECORD" POSITION
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

©Howard W. Sams & Co., Inc. 1958

414-7

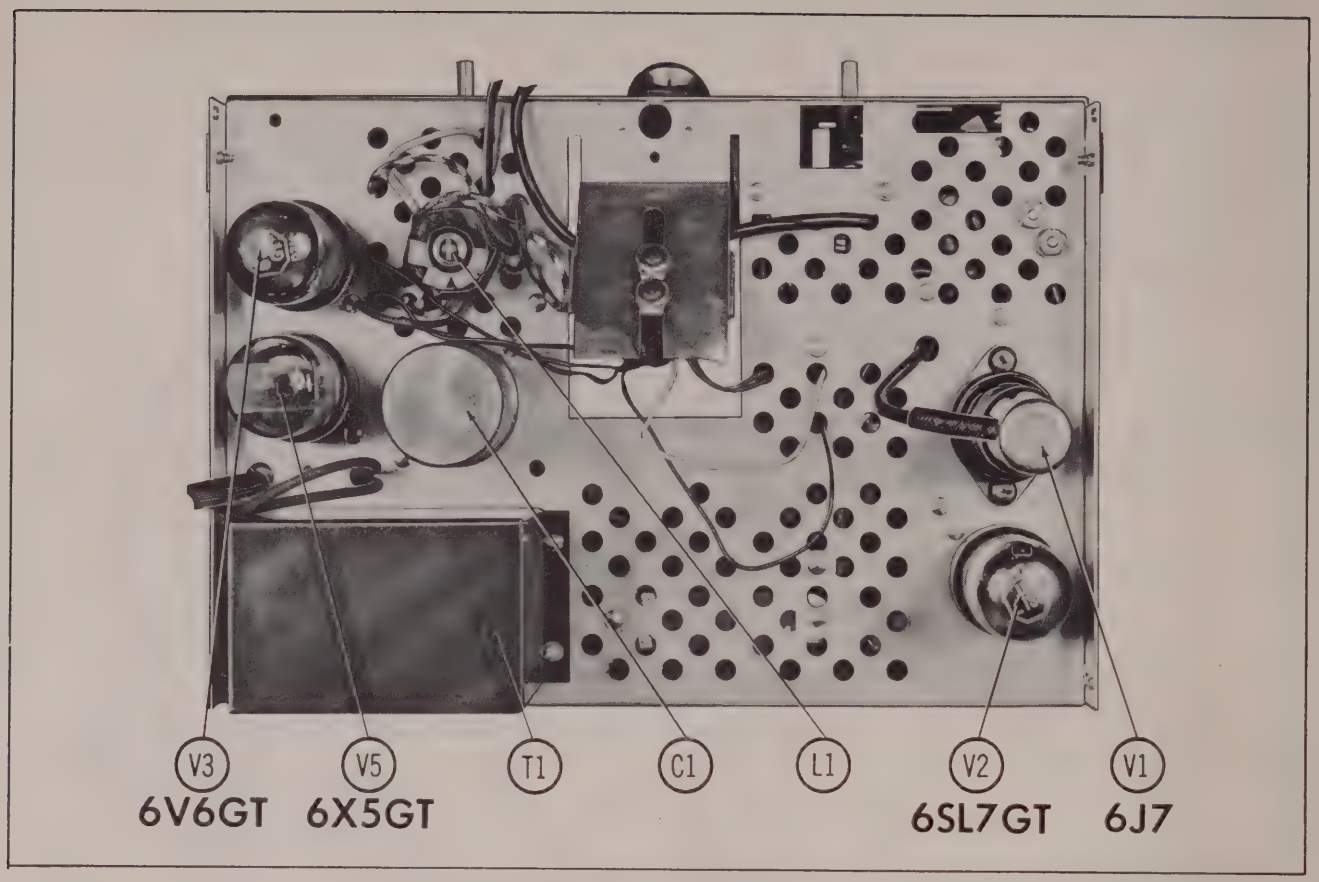


Figure 15. Rear View Of NL-2 Amplifier.

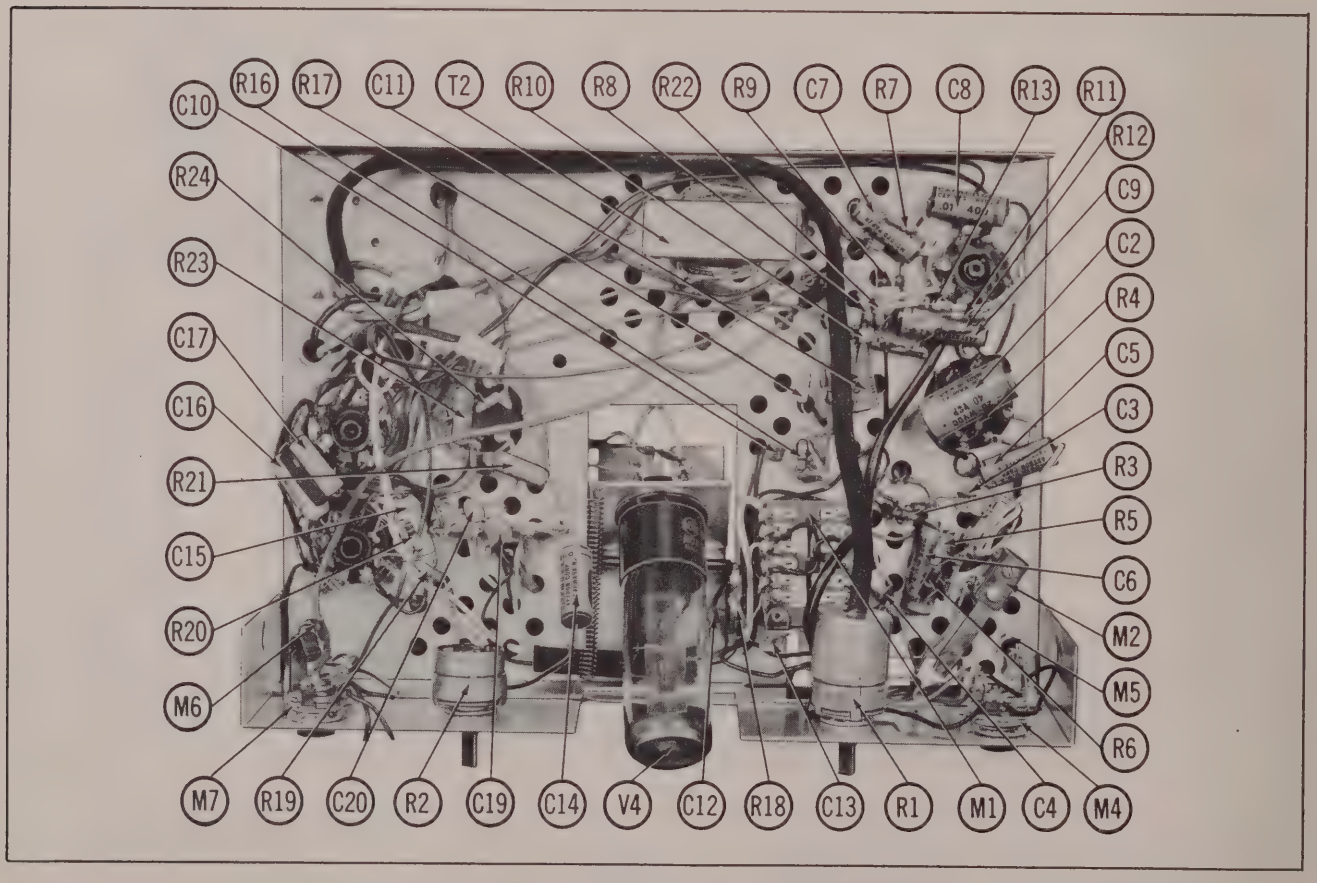
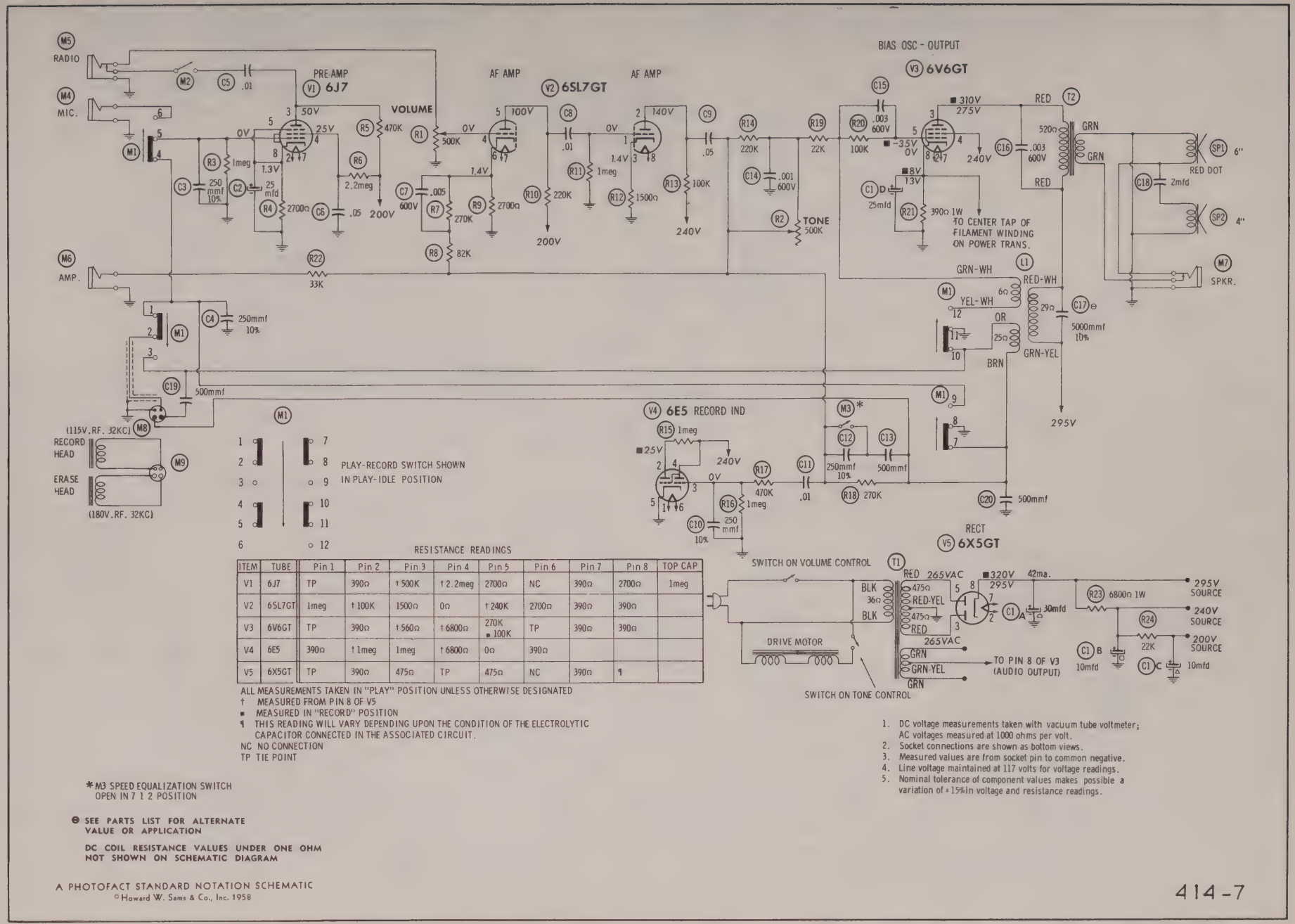


Figure 16. Front View Of NL-2 Amplifier.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	TOP CAP
V1	6J7	TP	390Ω	†500K	†2.2meg	2700Ω	NC	390Ω	2700Ω	1meg
V2	6SL7GT	1meg	†100K	1500Ω	0Ω	†240K	2700Ω	390Ω	390Ω	
V3	6V6GT	TP	390Ω	†560Ω	†6800Ω	270K ▪ 100K	TP	390Ω	390Ω	
V4	6E5	390Ω	†1meg	1meg	†6800Ω	0Ω	390Ω			
V5	6X5GT	TP	390Ω	475Ω	TP	475Ω	NC	390Ω	¶	

ALL MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED
† MEASURED FROM PIN 8 OF V5
▪ MEASURED IN "RECORD" POSITION
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.

*M3 SPEED EQUALIZATION SWITCH OPEN IN 7 1 2 POSITION

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC

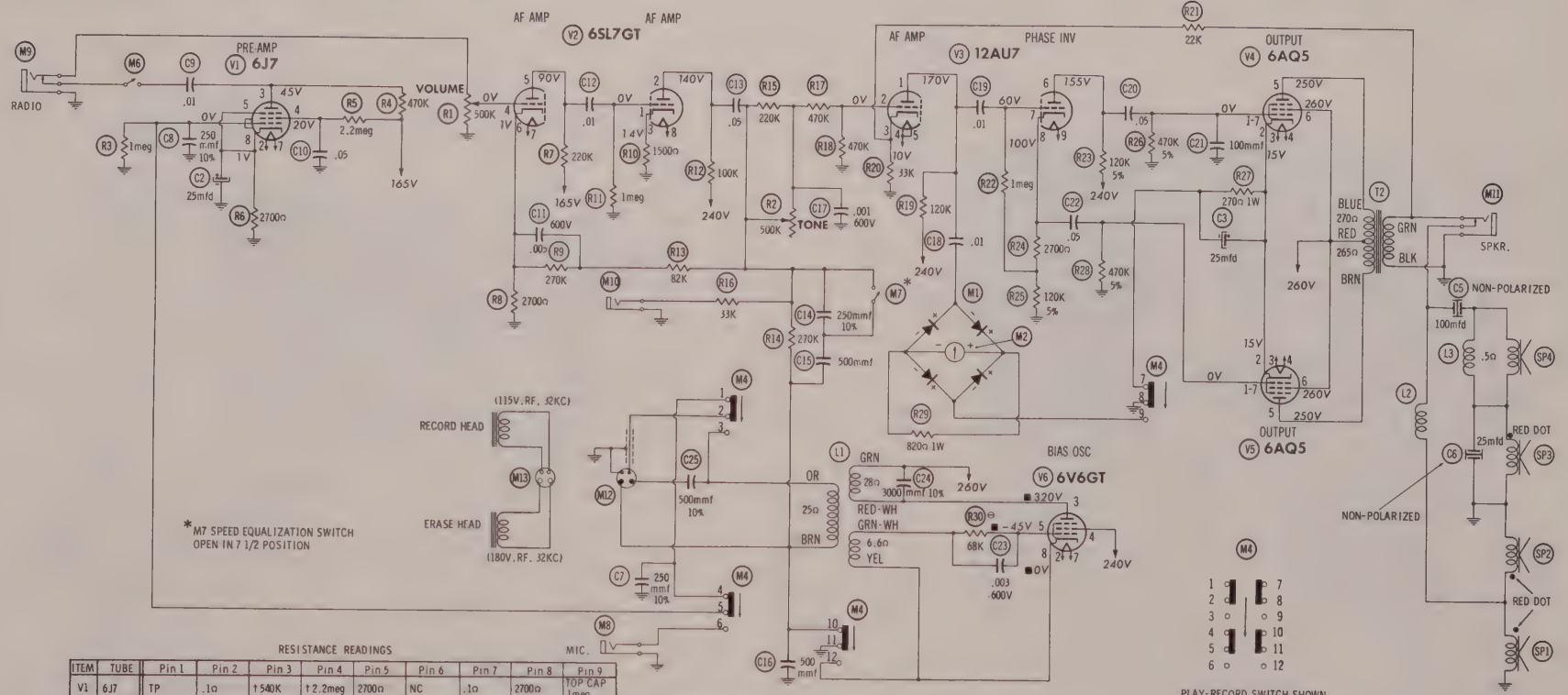
©Howard W. Sams & Co., Inc. 1958

414-7

Figure 17. Schematic Diagram Of Model NL-2.

PENTRON MODELS NL-1, -1S, NL-2, -2S, NL-3, -3S, TM-1, -4

FOLDER 7



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6J7	TP	.1Ω	†540K	†2.2meg	2700Ω	NC	.1Ω	2700Ω	TOP CAP 1meg
V2	6SL7GT	1meg	†100K	1500Ω	0Ω	†290K	2700Ω	.1Ω	.1Ω	
V3	12AU7A	†120K	470K	13K	.1Ω	.1Ω	†120K	1.1meg	120K	1Ω
V4	6AQ5	470K	270Ω	.1Ω	.1Ω	†920Ω	†750Ω	470K		
V5	6AQ5	470K	270Ω	.1Ω	.1Ω	†915Ω	†750Ω	470K		
V6	6V6GT	TP	.1Ω	†780Ω	†1600Ω	INF ▪ 68K	TP	.1Ω	INF ▪ 0Ω	
V7	6X5GT	TP	.1Ω	160Ω	TP	180Ω	TP	.1Ω	¶	

ALL MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED
† MEASURED FROM PIN 8 OF V7
▪ MEASURED IN "RECORD" POSITION
▲ MEASURED FROM PIN 8 OF V3
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION
TP TIE POINT

❶ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
©Howard W. Sams & Co., Inc. 1958

414-7

Figure 18. Schematic Diagram Of Model NL-3.

PARTS LIST AND DESCRIPTIONS
PRE-AMP

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Pre-Amp	12AX7	

ITEM No.	USE	TYPE	NOTES

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA PENTRON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1.	25	25	273-25614	PRS25V25	BBR25-25	TC36	TD-25-25	MT-0225	TVA-1205

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PENTRON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	10000		227-10342	BPD-01	DD-103	BYA10B1	DC511	5HK-S1	
C3	3000		263-3024	BPD-003	DD-302	BYA10D3	UC-523	5HK-D3	
C4	.05	400	263-50342	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	PENTRON PART No.	NOTES
R1	1meg		111-10521	
R2	2700Ω		111-27221	
R3	220K		111-22421	
R4	1meg		111-10521	

ITEM No.	RATING OHMS	RATING WATT	PENTRON PART No.	NOTES
R5	470K		111-47421	
R6	150K		111-15421	
R7	1500Ω		111-15221	
R8	100K		111-10421	

PARTS LIST AND DESCRIPTIONS AMP NL-1

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Pre-Amp	6J7	
V2	AF Amp	6SL7GT	

ITEM No.	USE	TYPE	NOTES
V3	Bias-Osc-Output	6V6GT	
V4	Rectifier	6X5GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA PENTRON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲ 30	350	285-50644	AFH4-68	D0390	FP457	TMQ-53	Q-330	R2711 *
B	■ 10	350			BR2035		TD-10-450	MT-4520	
C	▲ 10	350							
D	25	25	①						
C2	25	25	273-25614	PRS25V25	BBR25-25	TC36	TD-25-25	MT-0225	TVA-1205

①Not used in this application

* Non-Catalog Item

PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PENTRON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C3	250		227-25151		MD-251	L10T25			10%
C4	250		227-25151		MD-251	L10T25			10%
C5	.05	400	263-50342	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C6	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C7	.005	600	263-50262	P688N-005	D6-502	CUB6D5	GEM-625	6TM-D5	
C8	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C9	.05	400	263-50342	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C10	250		227-25151		MD-251	L10T25			10%
C11	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C12	250		227-25151		MD-251	L10T25			10%
C13	500		227-50152	BPD-0005	DD-501	L10T5	UC-535	5GA-T5	
C14	.001	600	263-10262	P688N-001	D6-102	CUB6D1	GEM-625	6TM-D1	
C15	.003	600	263-30262	P688N-003	D6-302	CUB6D3	GEM-623	6TM-D3	
C16	.003	600	263-30262	P688N-003	D6-302	CUB6D3	GEM-623	6TM-D3	
C17	3000		232-30241	1464-003		IR5D3	MCB461	MS-23	10%
C18	680		227-68151		MD-681				10%
C19	500		227-50152	BPD-0005	DD-501	L10T5	UC-535	5GA-T5	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PENTRON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	124-50413-7	B-60	A47-500K-Z	Q13-133	U48	Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	500K	½	126-50413-4	B-60	A47-500K-Z	Q13-133	U48	Tone
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	On-Off
R3A	500K	½	129-50413	B-59	B47-500K-S	B11-133	PTA55L	Record Level Indicator Adj.
B	Shaft			Not Req.	SK2	SK2	Not Req.	

* Use KR-1 with CRL "Red Label" controls and KB-1 with "Blue Label" controls.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	PENTRON PART No.	NOTES
R4	1meg		111-10521	
R5	2700Ω		111-27221	
R6	470K		111-47421	
R7	2.2meg		111-22521	
R8	33K		111-33321	
R9	270K		111-27421	
R10	2700Ω		111-27221	
R11	82K		111-82321	
R12	220K		111-22421	
R13	1meg		111-10521	
R14	1500Ω		111-15221	

ITEM No.	RATING OHMS	RATING WATT	PENTRON PART No.	NOTES
R15	100K		111-10421	
R16	100K		111-10421	
R17	820K		111-82421	
R18	220K		111-22421	
R19	22K		111-22321	
R20	270K		111-27421	
R21	100K		111-10421	
R22	390Ω	1	111-39131	
R23	6800Ω	1	111-68231	
R24	22K		111-22321	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA PENTRON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .275A	480VCT @ .040A	6.3VCT @ 1.5A	352A-28	P9210	P-3147		PC8418	24R11U	R-4A①

①Drill New Mounting Holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA PENTRON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	5800Ω	3-4Ω	342-12	Z1007	A-3019	AU-600	A-3849	26S49	S-5Z	

PARTS LIST AND DESCRIPTIONS (Continued)

COIL

ITEM No.	USE	REPLACEMENT DATA					NOTES
		PENTRON PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Bias Osc.	311A-13					

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	PENTRON PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	345B-19	6A1	

MISCELLANEOUS

ITEM No.	PART NAME	PENTRON PART No.	NOTES
M1	Lamp	423A-2	NE51
M2	Switch	534A-3	Play-Record (Slide Type)
M3	Switch	532A-6	Pre-Amp. Muting (SPST Leaf Type)
M4	Jack	552A-13	Mic.
M5	Jack	552-6	Radio
M6	Jack	552-6	Amp.
M7	Jack	552-6	Spkr.
M8	Plug	564-2	Four Pin
M9	Socket	554A-3	Four Pin

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting) ..... Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)

PARTS LIST AND DESCRIPTIONS AMP NL-2

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Pre-Amp	6J7	
V2	AF Amp	6SL7GT	
V3	Bias-Osc-Output	6V6GT	
V4	Record Ind.	6E5	
V5	Rectifier	6X5GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	PENTRON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲30	350	285-50644	AFH4-68	D0390	FP457	TMQ-53	Q-330	R2711*
B	■10	350			BR2035		TD-10-450	MT-4520	
C	▲10	350							
D	25	25							
C2	25	25	273-25614	PRS25V25	BBR25-25	TC36	TD-25-25	MT-0225	TVA-1205

* Non-Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	PENTRON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	250		227-25151		MD-251	L10T25			10%
C4	250		227-25151		MD-251	L10T25			10%
C5	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C6	.05	400	263-50342	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	PENTRON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C7	.005	600	263-50262	P688N-005	D6-502	CUB6D5	GEM-625	6TM-D5	
C8	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C9	.05	400	263-50342	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C10	250		227-25151		MD-251	L10T25			10%
C11	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C12	250		227-25151		MD-251	L10T25			10%
C13	500		227-50152	BPD-0005	DD-501	L10T5	UC-535	5GA-T5	
C14	.001	600	263-10262	P688N-001	D6-102	CUB6D1	GEM-625	6TM-D1	
C15	.003	600	263-30262	P688N-003	D6-302	CUB6D3	GEM-623	6TM-D3	
C16	.003	600	263-30262	P688N-003	D6-302	CUB6D3	GEM-623	6TM-D3	
C17	5000		232-50242	1464-005		1DR5D5	MCB465	MS-25	10% ①
C18	2.	50	263-20513						
C19	500		227-50152	BPD-0005	DD-501	L10T5	UC-535	5GA-T5	
C20	500		227-50152	BPD-0005	DD-501	L10T5	UC-535	5GA-T5	

①Some versions may use 3000mmf in this application (Part #232-30241).

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PENTRON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	126-50413-4	B-60	A47-500K-Z	Q13-133	U48	Volume
B	Shaft			Not Req	FS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	On-Off
R2A	500K	½	126-50413-4	B-60	A47-500K-Z	Q13-133	U48	Tone
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	Motor On-Off

* Use KR-1 with CRL "Red Label" controls and KB-1 with "Blue Label" controls.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		PENTRON PART No.	NOTES
	OHMS	WATT		
R3	1meg		111-10521	
R4	2700Ω		111-27221	
R5	470K		111-47421	
R6	2.2meg		111-22521	
R7	270K		111-27421	
R8	82K		111-82321	
R9	2700Ω		111-27221	
R10	220K		111-22421	
R11	1meg		111-10521	
R12	1500Ω		111-15221	
R13	100K		111-10421	
R14	220K		111-22421	
R15	1meg		111-10521	
R16	1meg		111-10521	
R17	470K		111-47421	
R18	270K		111-27421	
R19	22K		111-22321	
R20	100K		111-10421	
R21	390Ω	1	111-39131	
R22	33K		111-33321	
R23	6800Ω	1	111-68231	
R24	22K		111-22321	

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	PENTRON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.33A	530VCT @.042A	6.3VCT @1.84A	352A-17					25R02①	

①Drill New Mounting Hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	PENTRON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5800Ω	2-3Ω	342-12	Z1007	A-3019	AU-600	A-3849	26S49	S-5Z	

COILS

ITEM No.	USE	REPLACEMENT DATA					NOTES
		PENTRON PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Bias Osc.	311A-13					

PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	PENTRON PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	345B-19	6A1	
SP2	4"	PM	3-4Ω	345-18	4A07	

MISCELLANEOUS

ITEM No.	PART NAME	PENTRON PART No.	NOTES
M1	Switch	534A-3	Play-Record (Slide Type)
M2	Switch	532A-6	Pre-Amp Muting (SPST Leaf Type)
M3	Switch	532A-6	Speed Equalization (SPST Leaf Type)
M4	Jack	552A-13	Mic.
M5	Jack	552-1	Radio
M6	Jack	552A-13	Amp.
M7	Jack	552-1	Spkr.
M8	Plug	564-2	Four Pin
M9	Socket	554A-3	Four Pin

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting) .....Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)

PARTS LIST AND DESCRIPTIONS AMP NL-3

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Pre-Amp	6J7	
V2	AF Amp	6SL7GT	
V3	AF Amp-Phase Inv.	12AU7A	
V4	Output	6AQ5	
V5	Output	6AQ5	
V6	Bias Osc.	6V6GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	PENTRON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	450	285-90694	AFH4-18-10	D0171	FP446	TMQ-18	Q-060	TVL-4771.8
B	■30	450					TD-10-450	MT-4510	
C	▲10	350							
D	10	350							
C2	25	25	273-25614	PRS25V25	BBR25-25	TC36	TD-25-25	MT-0225	TVA-1205
C3	25	25	273-25614	PRS25V25	BBR25-25	TC36	TD-25-25	MT-0225	TVA-1205
C4	100	6	273-10796	PRS6V100	BBR100-6	TT6X100	TD-100-6	MTH-0610	TVA-1101
C5	100	50NP	293-10713		BR20015 †		†TD-200-150		R2710*
					BR20015 †		TD-200-150		
C6	25	50NP	293-25613		BR505	TC39	TD-50-50†	MT-0550	R2709*
					BR505 †	TC39 †	TD-50-50†	MT-0550 †	

† Connect Negative Leads Together

* Non-Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	PENTRON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C7	250		227-25151		MD-251	L10T25			10%
C8	250		227-25151		MD-251	L10T25			10%
C9	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	

PARTS LIST & DESCRIPTION (continued)

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	PENTRON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C10	.05	400	263-50342	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C11	.005	600	263-50262	P688N-005	D6-502	CUB6D5	GEM-625	6TM-D5	
C12	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C13	.05	400	263-50342	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C14	250		227-25151		MD-251	L10T25			10%
C15	500		227-50152	BPD-0005	DD-501	L10T5	UC-535	5GA-T5	
C16	500		227-50152	BPD-0005	DD-501	L10T5	UC-535	5GA-T5	
C17	.001	600	263-10262	P688N-001	D6-102	CUB6D1	GEM-621	6TM-D1	
C18	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C19	.01	400	263-10342	P488N-01	D6-103	CUB4S1	GEM-411	4TM-S1	
C20	.05	400	263-50342	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C21	100		232-10152	1468-0001	DD-101	22R5T1	MC235	1FM-31	
C22	.05	400	263-50342	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C23	.003	600	263-30262	P688N-003	D6-302	CUB6D3	GEM-623	6TM-D3	
C24	3000		232-30241	1464-003		1R5D3	MCB463	MS-23	10%
C25	500		232-50151	1469-0005	MD-501	5R5T5	MCB245	MS-35	10%

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	PENTRON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	126-50413-4	B-60	A47-500K-Z	Q13-133	U48	Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	On-Off
R2A	500K	½	126-50413-4	B-60	A47-500K-Z	Q13-133	U48	Tone
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	Relay

* Use KR-1 with CRL "Red Label" controls and KB-1 with "Blue Label" controls.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		PENTRON PART No.	NOTES
	OHMS	WATT		
R3	1meg		111-10521	
R4	470K		111-47421	
R5	2.2meg		111-22521	
R6	2700Ω		111-27221	
R7	220K		111-22421	
R8	2700Ω		111-22721	
R9	270K		111-22421	
R10	82K		111-82321	
R11	1meg		111-10521	
R12	100K		111-10421	
R13	1500Ω		111-15221	
R14	270K		111-27421	
R15	220K		111-22421	
R16	33K		111-33321	
R17	470K		111-47421	
R18	470K		111-47421	

ITEM No.	RATING		PENTRON PART No.	NOTES
	OHMS	WATT		
R19	120K		111-12421	
R20	33K		111-33321	
R21	22K		111-22321	
R22	1meg		111-10521	
R23	120K 5%		111-12425	
R24	2700Ω		111-27221	
R25	120K 5%		111-12425	
R26	470K 5%		111-47425	
R27	270Ω	1	111-27131	
R28	470K 5%		111-47425	
R29	820Ω	1	111-82132	
R30	68K		111-68321	Note 1
R31	750Ω	7	151-75191	
R32	820Ω	1	111-82132	
R33	68K	1	111-68332	

Note 1. Some versions may use 47K in this application (Part # 111-47321).

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	PENTRON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @.5A	575VCT @.070A	6.3VCT @2.8A	352-33					22R02①	

① Fabricate Mounting

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	PENTRON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7000Ω CT	3-4Ω	342A-19	Z1009 ①	A-2901	AU-606	A-3870	22S58	S-55X	① Drill New Mounting Hole.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA					
		PENTRON PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Bias Osc.	311A-13					
L2	Speaker Choke	341A-2					

CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ∿)	PENTRON PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L3		.5Ω	430MMH	Part of SP4						

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	PENTRON PART No.	QUAM PART No.	
SP1	6"	PM	3-4Ω	345-15	6A1	① Part # Includes (L3)
SP2	6"	PM	3-4Ω	345-15	6A1	
SP3	6"	PM	3-4Ω	345B-19	6A1	
SP4	4"	PM	4-5Ω	345-21①	4A1TZ4.2	

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	PENTRON PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1		454-9		60-8694		

MISCELLANEOUS

ITEM No.	PART NAME	PENTRON PART No.	NOTES
M2	Meter	478A-5	Record Level
M3	Lamp	422-51	#47
M4	Switch	534A-3	Play-Record (Slide Type)
M5	Relay	534A-15	Drive Motor
M6	Switch	532A-6	Pre-Amp. Muting (SPST Leaf Type)
M7	Switch	532A-6	Speed Equalization (SPST Leaf Type)
M8	Jack	552A-13	Mic.
M9	Jack	552-1	Radio
M10	Jack	552A-13	Amp.
M11	Jack	552-1	Spkr.
M12	Plug	564-2	Four Pin
M13	Socket	554A-3	Four Pin

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	824B-17-1	Control, Gray
Knob	824B-17-2	Control, Brown
Knob	714A-276	Speed Shift Lever
Cover	964D-90	Top Casting (Includes Trim Plate Assembly)Model NL-1
Cover	964A-371	Top Casting (Includes Trim Plate Assembly)Model NL-2
Cover	964A-372	Top Casting (Includes Trim Plate Assembly)Model NL-3
Panel	711A-708	Top Cover, Model NL-1
Panel	711D-62	Top Cover, Model NL-2
Panel	711D-64	Top Cover, Model NL-3

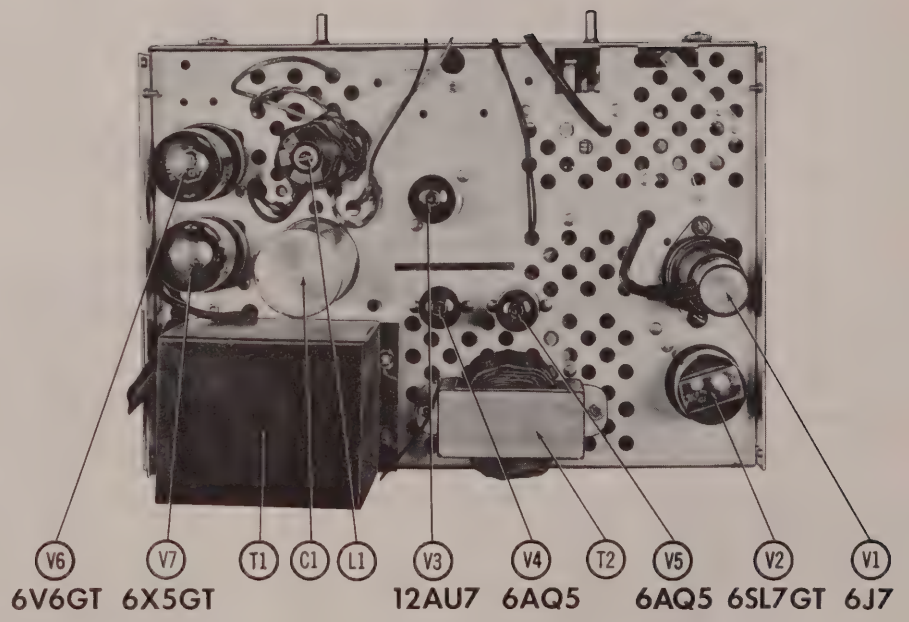
PARTS LIST & DESCRIPTION (continued)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

CHASSIS—REAR VIEW

NL-3



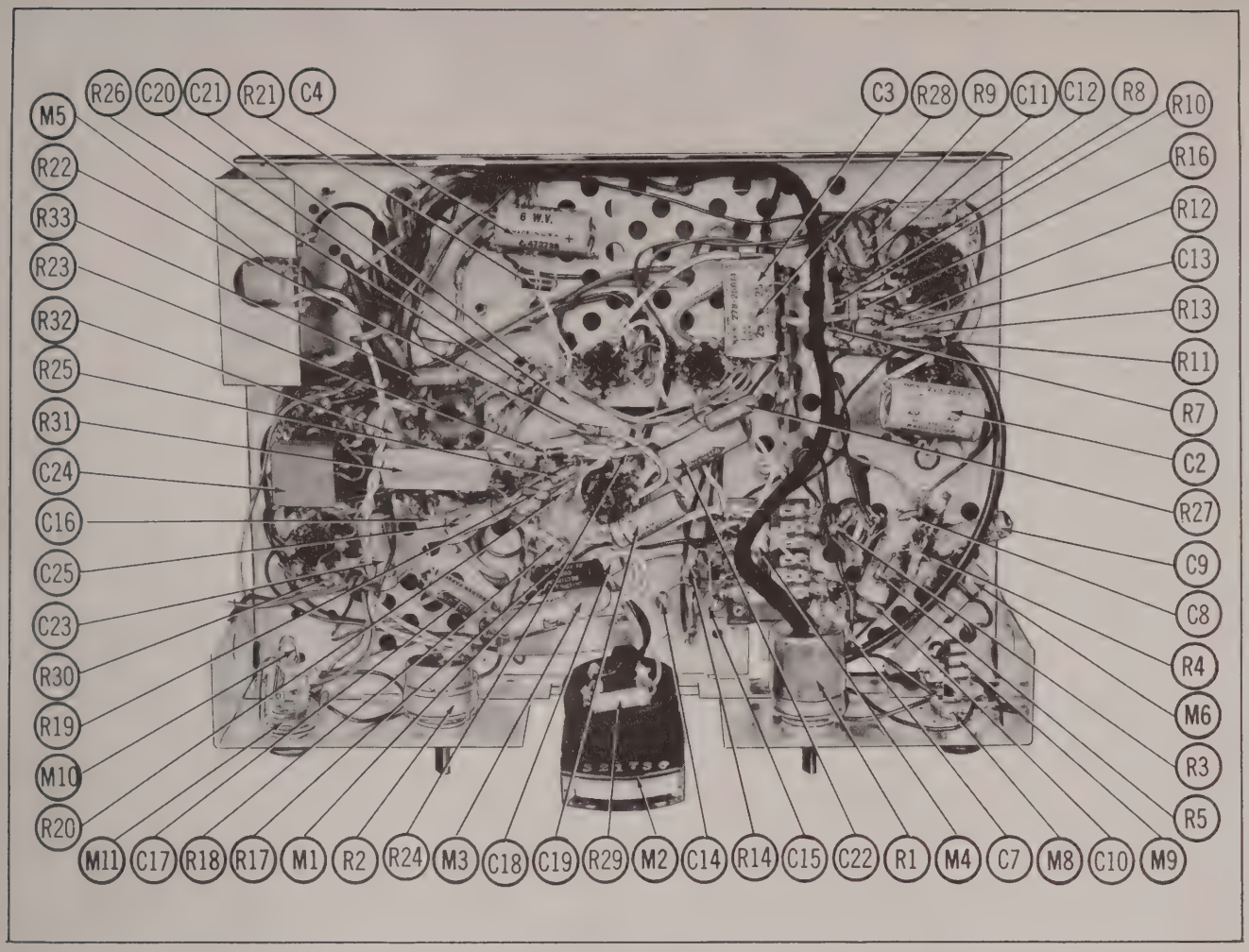


Figure 19. Front View Of NL-3 Amplifier.

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	714A-276-1	Reel Spindle Cap (Gray)
	714A-276-2	Reel Spindle Cap (Brown)
2	765B-12-1	Reel Rest (Gray)
	765B-12-2	Reel Rest (Brown)
3	824B-17-1	Control Knob (Gray)
	824B-17-2	Control Knob (Brown)
4	714A-276	Speed Shift Lever Knob
5	824B-13-1	Head Cover Casting (Gray)
	824B-13-2	Head Cover Casting (Brown)
6	611-61633	#6-32 x 1 Phillips O.H.M.S.
7	964A-374	Top Cover Casting & Trim Plate Ass'y. (Model TM-1)
	964D-90	Top Cover Casting & Trim Plate Ass'y. (Model NL-1)
	964A-371	Top Cover Casting & Trim Plate Ass'y. (Model NL-2)
	964A-372	Top Cover Casting & Trim Plate Ass'y. (Model NL-3) (Ref. No. 7 Includes Items 7A, 7B, 7C, & 7D)
7A	761D-47	Top Trim Plate (Model TM-1)
	761D-49	Top Trim Plate (Model NL-1)
	761D-48	Top Trim Plate (Model NL-2)
	761A-90	Top Trim Plate (Model NL-3)

Ref. No.	Part No.	Description
7B	824D-2-1	Top Cover Casting (Gray)
	824D-2-2	Top Cover Casting (Brown)
7C	619-48	Escutcheon Drive Pin
7D	711A-498	Cover Clip
8	532A-40	Motor On-Off Switch (Model TM-1)
9	612-60464	#6-32 x 1/4 Hex. Hd. Self Tap. Screw
10	711D-62	Top Cover Panel (Model TM-1)
	711A-708	Top Cover Panel (Model NL-1)
	711D-62	Top Cover Panel (Model NL-2)
	711D-64	Top Cover Panel (Model NL-3)
11	963C-11	Head Assembly (Models TM-1, NL-1, NL-2, & NL-3)
11A	964C-56	Record-Playback Head
11B	964B-132	Record-Playback Pole Piece
11C	964C-57	Double Gap Erase Head
11D	964B-134	Double Gap Erase Pole Piece
12	963C-12	Stacked Stereo And Double Gap Erase Head Assembly (Models TM-4, NL-1S, NL-2S, & NL-3S)
12A	983A-8	Stacked Stereo Head
	964C-54	Combination Record-Play-Erase Head (Used in early production for Models TM-1 & NL-1. Not shown on exploded view.)

FOLDER 7

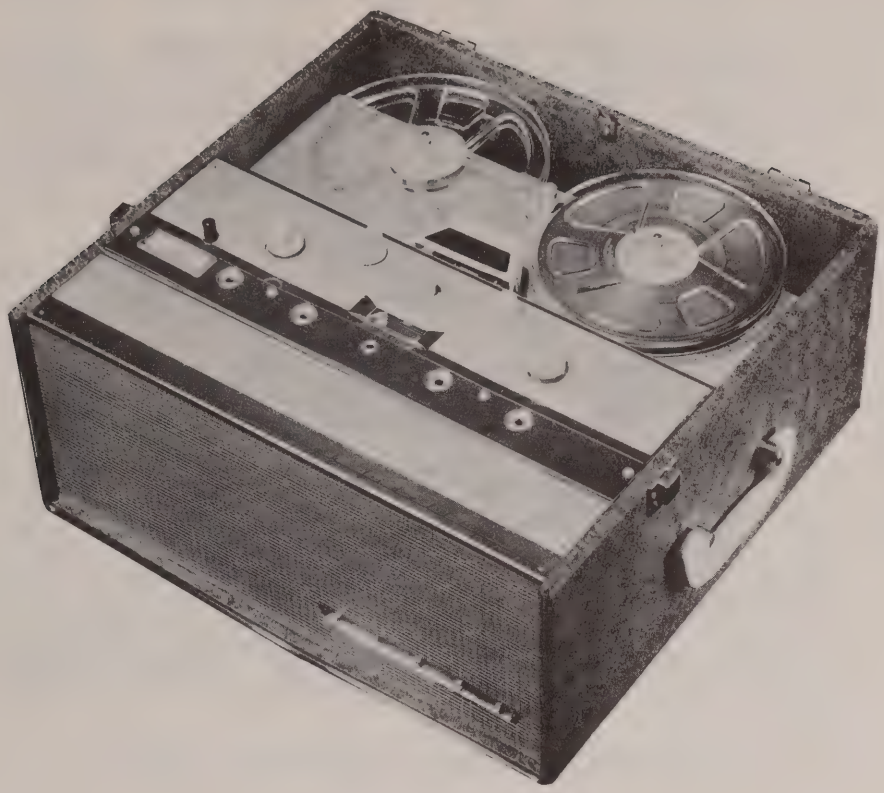
Ref. No.	Part No.	Description
	964B-90	Pole Piece (For combination Record-Play-Erase Head)
13	611-80344	#8-32 x 3/16 F.H.M.S.
14	964A-335	Pressure Plate & Pad Assembly
14A	871A-22	Felt Pressure Pad
14B	619-144	.125 Crescent Retaining Ring
15	611-20314	#2-56 x 3/16 R.H.M.S.
16	964A-334	Carrier Bracket Assembly
17	813A-11	Stud, Phenolic Rod
18	964A-333	Carrier Plate Assembly
19	742A-35	Cut-Off Switch Spring
20	813A-10	Spacer
21	619A-148	.25 Crescent Retaining Ring
22	964A-116	Capstan Pressure Roller
22A	714A-47	Capstan Pressure Roller Shaft
23	616A-3169	.25 x .5 x .01 Clock Steel Washer
24	764A-78	Speed Change Shaft Knob
25	711A-707	Speed Change Sector
26	964A-339	Speed Shift Lever Assembly
27	613-10896	#10-32 x 1/2 Socket Hd. Mtg. Screw
28	617-1134	#10 Ext. Tooth Lockwasher
29	616-1144	.203 x .438 x .031 Flat Steel Washer
30	619-146	3/16" Crescent Retaining Ring
31	616A-24	.19 x .38 x .01 Clock Steel Washer
32	498A-2	Counter (Models NL-2 & NL-3)
33	814-59	Record Lock Button
34		#4-40 x 1 R.H.M.S.
35		Flat Washer, Steel
36	734A-31	Tape Post
37	964A-114	Pressure Pad Carrier Assembly
38	616A-3169	.25 x .5 x .01 Clock Steel Washer
39	712A-78	Compression Spring
40	964A-340	Mechanism Plate Rivet Ass'y. (Model TM-1)
	964D-35	Mechanism Plate Rivet Ass'y. (Model NL-1 & NL-2)
	964A-347	Mechanism Plate Rivet Ass'y. (Model NL-3)
40A	964A-268	Control Assembly
41	711A-709	Rocker Arm
42	964B-130	Play & Record Control Cam Ass'y.
43	964A-23	Slide Plate Assembly
44	711A-330	Pressure Arm Lever
45	614-6084	#6-32 Hex. Nut (Some Models use screw part # 613-60464 in this application)
46	712A-75	Pressure Finger Spring
47	711B-164	Wind & Rewind Slide Plate
48	964C-51	Idler Release Lever Assembly
49	964B-131	Control Shaft Assembly
50	619A-47	Detent Spring
51	711B-161	Brake Clip
52	616-8124	.16 x .38 x .03 Flat Steel Washer
53	611-60454	#6-32 x 1/4 B.H.M.S.
54	711A-720	Take-up Adj. Lever
55	964A-338	Spring Ring Assembly
56	712A-80	Idler Lever Spring
57	712A-5	Take-up Pressure Spring
58	712A-6	Pressure Roller Spring
59	711A-209	Idler Stop Plate
60	611-50313	#5-40 x 3/16 R.H.M.S.
61	964A-129	Take-up Adjusting Lever Assembly
62	613-60496	#6-32 x 1/4 Socket Hd. M.S.
63	617-6094	#6 Int. Tooth Lockwasher
64	964A-291	Tie Bar Assembly
65	964A-336	Control Spring Plate Assembly
66	764A-18	Spacer
67	714A-530	Speed Change Shaft & Arm Assembly
68	619A-20	.313 "E" Ring
69	714A-336	Speed Change Shaft
70	711A-343	Speed Change Idler Channel
71	617-8114	#8 Int. Tooth Lockwasher
72	616-7209	.63 x .31 x .01 Clock Steel Washer
73	614-8114	#8-32 Hex. Nut
74		#8-32 x 3/8 Allen Hd. Set Screw
75	964C-60	Left Brake Arm Assembly
75A	881A-52	Brake Cork Pad
76	964A-267	Flywheel & Capstan Assembly
77	611-81664	#8-32 x 1 Hex. Hd. M.S.
77A	611-81664	#8-32 x 1 Hex. Hd. M.S.
77B	611-81664	#8-32 x 1 Hex. Hd. M.S.
78	614-8114	#8-32 Hex. Nut.
78A	614-8114	#8-32 Hex. Nut.
78B	614-8114	#8-32 Hex. Nut.
79	615-1124	#10-32 Elastic Stop Nut
80	712A-60	Compression Spring
81	611-80454	#8-32 x 1/4 B.H.M.S. (Not used in some models)
82	742B-1	Brake Pivot Spring (Not used in some models)
83	964C-59	Right Brake Arm Assembly
83A	881A-52	Brake Cork Pad
84	871A-23	Flywheel Washer, Felt
85	619A-20	.313 "E" Ring
86	616-7209	.63 x .31 x .01 Clock Steel Washer
87	714A-478	Equalizer Spacer
88	964B-19	Equalizer Bar & Bearing Assembly
89	714A-463	Feed Reel Spindle
90	714A-183	Equalizer Pivot Stud
91	712A-79	Idler Spring
92	711A-346	Idler Spring Clip
93	714A-462	Take-up Reel Spindle
94	964A-130	Idler Wheel
95	964A-139	Idler Bracket Sub Assembly
96	613-80306	#8-32 x 3/16 Allen Hd. Set Screw
97	899A-3	Take-up Belt, .3125 x 12.625
98	964A-91	Take-Up Pulley Assembly
99	714A-167	Motor Pulley (60 Cycle)
	714-174	Motor Pulley (50 Cycle)
100	714A-171	Belt Pulley
101	899A-2	Feed Belt, .3125 x 17.25
102	714A-491	Rewind Pulley
103	529A-16	Flexible Shaft (Models NL-2 & NL-3)
104	835A-6	Cable Clamp (Models NL-2 & NL-3)
105	711A-597	Cable Clamp Support Bracket (Models NL-2 & NL-3)
106	616A-9209	.377 x .625 x .01 Clock Steel Washer
107	964B-20	Motor Support Plate Assembly
	711B-75	Motor Support Plate
108	611-10454	#10-32 x 1/4 B.H.M.S.
109	616-1240	.203 x .75 x .047 Steel Washer
110	711A-649	Motor Plate
111	367B-8	Alliance Motor
	367B-6	General Industries Motor
112	717A-20	Motor Fan with Set Screw
	964A-282	Motor Fan & Grommet Assembly
113	367B-15	Fasco Motor
	367B-12	Universal Motor

PHOTOFACT* Folder

EIA MEMBER

**TOWER
MODEL 4691**

TOWER
MODEL 4691



TOWER
MODEL 4691

GENERAL INFORMATION

Tower Model 4691 tape recorders record and play back two tracks of material on standard-width recording tape, thus doubling recording and playback time.

The Model 4691 has an illuminated meter-type volume level indicator, and markings on the meter show the proper volume level for recording. The meter light indicates the unit is on.

Tape speeds are 3 3/4 and 7 1/2 ips. Using both tape tracks, recording time is as follows:

Reel Size	3 3/4" Speed	7 1/2" Speed
5" (600 ft.)	1 hour	1/2 hour
7" (1200 ft.)	2 hours	1 hour

Connect this recorder to an outlet supplying 110-120 volts, 60 cycles AC only.

Supplied by:

Sears, Roebuck and Company
925 South Homan Ave.
Chicago 7, Illinois

This material compiled and published by

HOWARD W. SAMS & CO., INC., INDIANAPOLIS, INDIANA
C357

Copyright 1958 • All Rights Reserved

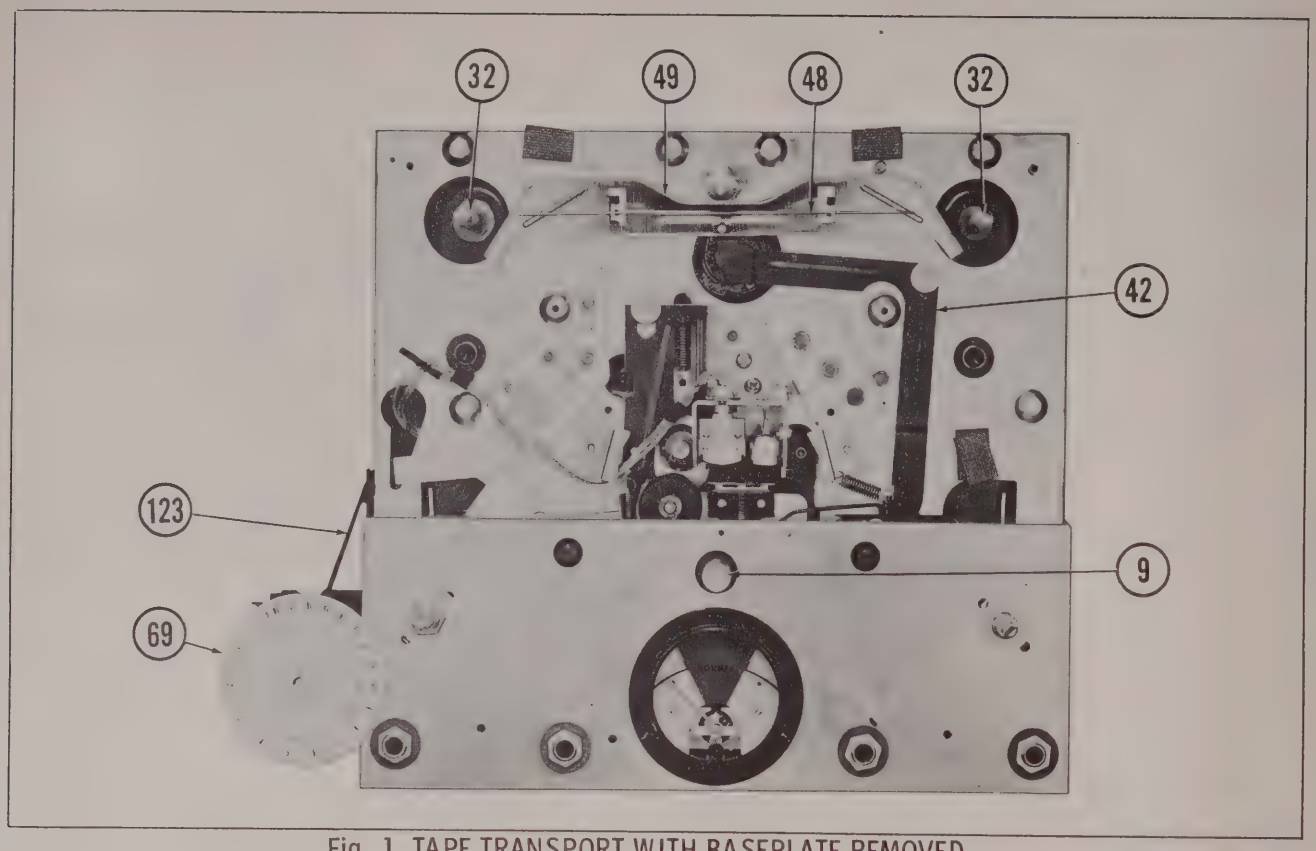


Fig. 1 TAPE TRANSPORT WITH BASEPLATE REMOVED

PREPARING RECORDER FOR OPERATION

1. Remove power cord, microphone, empty reel, and reel of tape from storage space at rear of set.

2. Plug power cord into any AC outlet having proper frequency and power.

3. Before operating, the operator should familiarize himself with the controls.

FUNCTION OF CONTROLS

On-Off-Loudness Control

Left-hand knob on recorder control panel energizes the amplifier and controls volume on record and playback.

Tape Drive Control

This control operates the tape drive mechanism for record and playback. It has two postions: Idle (left or counterclockwise) and Playback (right or clockwise).

Record-Edit Control

This control is used with the tape drive control. With Record-Edit control in up (normal) position, amplifier circuit is set for playback. With Record-Edit control held down and Tape Drive control turned to right, Record-Edit control is locked in down position, and recorder will record.

Fast Forward-Rewind Control

With Tape Drive control in Idle position, turning Forward-Rewind control to right (clockwise) rapidly winds tape on take-up reel. Moving to left (counterclockwise) rapidly rewinds tape on feed reel.

Tone-Monitor Control and Motor Switch

When Amplifier is on, the motor is turned on and off by this control. It acts as a monitor control as well as regulating tone during playback.

With this control turned off, tape mechanism may be engaged and Loudness control set while tape remains stationary.

Speed Control

To change speed, place speed button Up for 3 3/4 ips and Down for 7 1/2 ips.

CAUTION: Do not operate speed control unless motor is running.

Threading Tape

1. Place full reel of tape on right reel plate and an empty reel on left reel plate. Reel slots must engage pins on reel plates.

2. Unwind about 10" of tape. Pull a section of tape taut with both hands and insert in tape slot. Make sure dull-coated side faces rear of recorder.

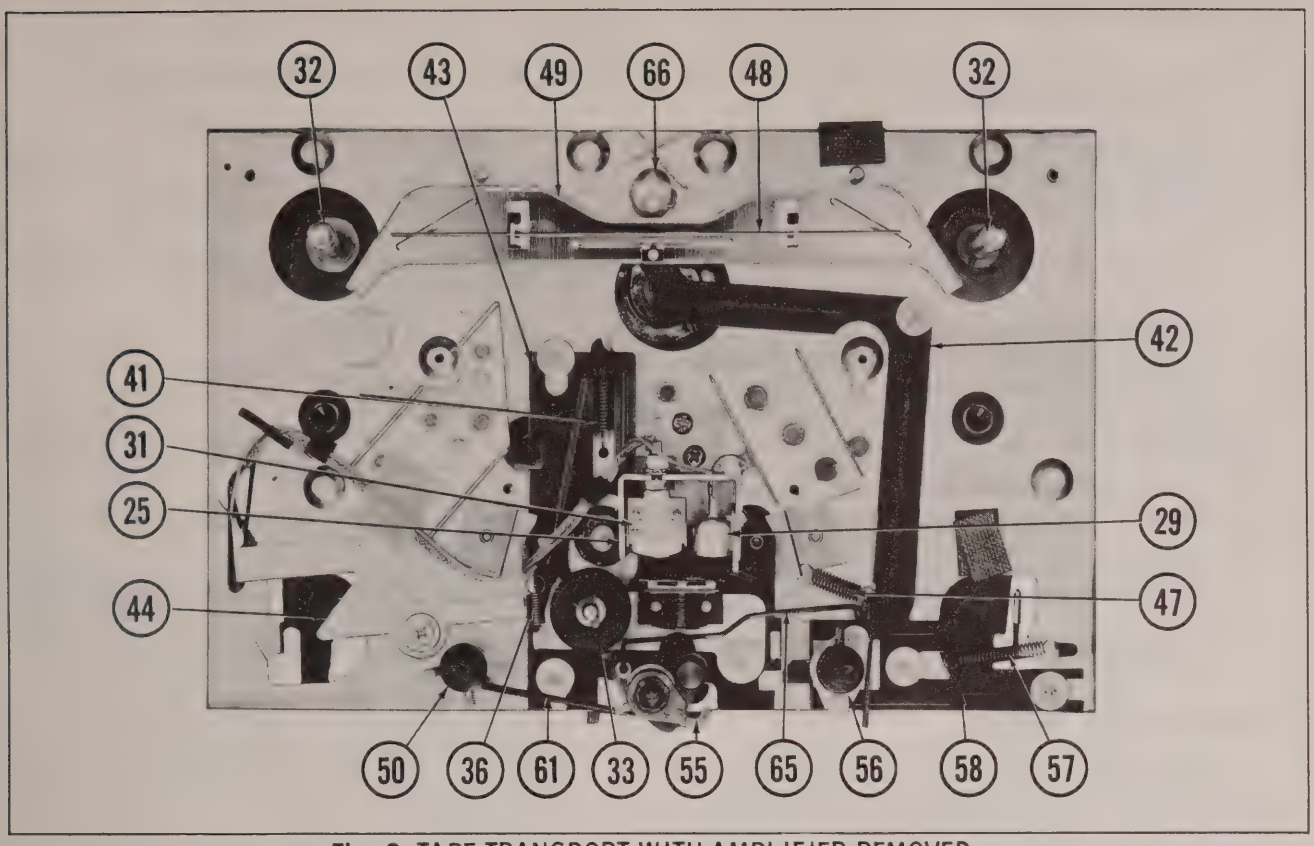


Fig. 2 TAPE TRANSPORT WITH AMPLIFIER REMOVED

3. Insert free end of tape into one of three radial slots in hub of empty reel. Turn reel several turns clockwise until tape is secured and all slack is taken up between reels.

To Record from Microphone

1. Turn On-Off-Loudness control on.
2. Insert microphone plug into Mike jack.
3. Make sure Tone-Monitor and Motor Switch is off. Depress Record-Edit control and turn Tape Drive control to right until both controls lock in place.
4. Speak into microphone in a normal voice and turn Loudness control to right until pointer on Recording Level Meter fluctuates within Normal range only.
5. Turn on Tone-Monitor and Motor switch and adjust Tone-Monitor control to proper level. Adjust Speed control for desired speed, 3 3/4 or 7 1/2 ips.

NOTE: Correct recording volume is important. A signal that is too weak and does not cause record level to fluctuate will result in weak playback and high background noise. A signal that is too strong, causing the level indicator to go above the Normal range, will result in distortion.

To Record from Radio or TV Receiver

Recordings from a radio or TV Receiver may be made by one of three methods:

1. Place microphone about 6" to 12" in front of receiver speaker. Turn receiver volume control to a normal level and tone control to maximum treble. Set recording level and proceed with recording as described under "To Record from Microphone."
2. Use speaker cable made with a two-conductor phone plug on one end and two alligator clips on the other end. Connect alligator clips across voice-coil terminals on receiver speaker and insert cord plug into Radio jack. Set receiver volume and tone controls as described in Step 1. Set recording level and proceed as described under "To Record from Microphone."
3. Use a shielded cable with a two-conductor phone plug on one end and with the other end connected across receiver volume control. Insert phone plug into Radio jack. Set recording level and proceed with recording as described under "To Record from Microphone." The receiver volume and tone controls have no effect on the recording.

To Record from Phonograph

1. If a phone-type plug is used on pickup leads, insert plug into Radio jack, set recording level, and proceed as described under "To Record from microphone."
2. If the more common pin-type plug is used, an adaptor is needed. Insert pin plug into adaptor and plug adaptor into Radio jack.

Dual-Track Recording

1. After a reel of tape has been recorded, turn Tape Drive control to Idle.
2. Remove reels from recorder. Turn over full reel and place on right reel plate; place empty reel on left reel plate.
3. Properly thread tape and proceed with recording.
4. After this track has been recorded, first track can be played without rewinding by reversing reel as described in Step 2.

To Play A Recording

1. Thread tape as described under "Threading Tape."
2. Without pressing Record-Edit button, turn Tape Drive control clockwise.
3. Adjust Loudness and Tone controls for desired listening level.

To Use an External Speaker

Frequency response can be improved by using a larger speaker than the one in the recorder. To play recorder with an external speaker, use the speaker cable supplied as outlined in the following:

1. Connect cable to external speaker with alligator clips.
2. Plug speaker into external speaker jack. Recorder will now play through the external speaker.

CAUTION: Do not plug cable into Output jack unless external speaker is attached to plug, because output tube, transformer, and Tone control may be damaged.

To Edit and Splice Tape

NOTE: It is impossible to edit and splice one track without affecting the other track. Therefore, recordings to be edited should be limited to one track only.

1. Tape may be edited by cutting out unwanted portions or by joining selections into another sequence. Announcements may be inserted between selections. Unused sections can be spliced for re-use.
2. For best results, cut tape at a slight diagonal. Join ends on glossy side with splicing tape and trim off excess width.

Erasing Recorded Material

Any recording is automatically erased before a new one is put on the tape. To erase a recording without putting anything on tape, follow normal recording procedure, but leave Loudness control set at its extreme counterclockwise position.

To Use as a Public Address System

1. Insert microphone plug into Radio jack.
2. Leave Tape drive control on Idle.
3. Speak into microphone and adjust Loudness and Tone controls for desired level.
4. To avoid feedback howl, do not place microphone too close to speaker.

DISASSEMBLY

To Remove Unit from Case

1. Remove eight wood screws (11) from control panel escutcheon plate.
2. Remove all control knobs and reel plate assemblies.
3. Remove hex nuts and washers from controls.
4. Remove screws (6) and (7).
5. Remove top cover assembly (15).
6. Remove top cover baffle (19).
7. Remove spacers (18).
8. Remove four screws from bottom of case.
9. Disconnect speakers.
10. Lift unit from case.

To Remove Amplifier from Tape Transport Mechanism

1. Disconnect head and motor leads.
2. Remove bottom cover by removing 5 snaps.
3. Remove screw at front center of chassis holding tape transport mechanism to chassis.
4. Remove screws holding chassis to brackets.
5. Lift chassis from tape transport mechanism.

To reassembly, reverse the foregoing procedure.

ADJUSTMENTS

Spindle End Play Adjustments

Spindles (32) should have 1/32" to 1/16" up and down movement. To obtain correct amount of end play, loosen set screw in pulleys (103) and (120) and move pulleys up or down.

Brake Adjustment

1. Bend tap A (see Exploded View) on take-up reel arm (77) and tab B (see Exploded View) on take-up lever (86) joined by take-up spring (85) until tabs are perpendicular to plate.
2. Plug line cord into outlet, turn on motor and amplifier switches, place Tape Drive control in Idle and Fast Forward-Rewind control in Neutral.

3. Place full reel of tape on take-up spindle but do not thread. Turn Fast Forward-Rewind control to Rewind position. Adjust tab C (see Exploded View) until take-up spindle rotates. Readjust until it stops.

4. Place full reel of tape on feed spindle but do not thread tape. Turn Fast Forward-Rewind control to Fast Forward position. Adjust tab D (see Exploded View) until feed spindle rotates. Readjust until it stops.

5. Since there may be interaction between these adjustments, Steps 3 and 4 may have to be repeated.

Take-up Tension Adjustment

If take-up tension is not properly adjusted, flutter will occur. This is particularly noticeable at 3 3/4 ips and during initial winding of tape on take-up reel. Do not adjust if flutter occurs during first few feet of tape take-up. This is normal, and recording should not be made during this time.

1. Place a full reel of prerecorded tape on feed spindle (right), thread tape as for playback, and wind about 5 feet of tape onto take-up reel. Use small (5") reels and tape recorded a 3 3/4 ips.

NOTE: Footage indicator belt must be on pulleys.

2. Check take-up reel action by slowly turning Record-Play control to Play. Take-up reel should start revolving at same time pressure roller (33) engages with capstan shaft F. If adjustment is correct, there should be no tape overrun before it starts to take up, or no flutter in the sound. If adjustment is required, proceed with Steps 3 and 4.

3. Bend tab B on take-up lever (86) to right or left until proper take-up action with no overrun or flutter is obtained and tape from feed reel to heads shows no evidence of vibrating.

4. Slight additional adjustment may be obtained by bending tab A on take-up reel arm (77) and tab G on take-up lever (86).

Play-Record Head Adjustment

If play-record head (31) is not perfectly aligned with tape, low output, loss of high frequencies, or track overlap may result.

To Align Play-Record Head (31)

1. First, adjust for output and frequency response. This adjustment must be made with a 3,000-cycle tape, recorded by a unit in good operating condition. Connect an output meter across speaker voice coil of unit to be adjusted. While playing back the 3,000-cycle note tape, move head back and forth on mounting until maximum deflection on output meter is achieved.
   If a 3,000-cycle note tape is not available, use a recording with a high note content and adjust as described in the foregoing.

Erase Head Adjustment

Erase head (29) and head mounting bracket assembly (25) have been prealigned at the factory, and no adjustments are provided. To replace erase head (29), play-record head (31) must be removed. After erase head is installed, play-record head (31) must be realigned. (See "Play-Record Head Adjustment.")

CLEANING

Record and erase heads, capstan shaft F (see Exploded View) and pressure roller (33) accumulate tape coating residue, worn off the tape as it passes these parts. This can cause distortion, weak output, and poor erasure. Use a soft cloth and alcohol to clean head surfaces, capstan, and pressure roller.

LUBRICATION

Approximately once a year, or when parts are replaced, lubricate as follows:

With No. 20 motor oil:

1. Take-up reel arm (77) bushing.

2. Feed reel arm (109) bushing.

3. Bearings of spindles (32).

4. Flywheel (98) bearings.

With "Staput" No. 312 grease, "Lubriplate" or equivalent.

1. Pressure plate (43) at slide button, and guide on right side.

2. Stud of cam and bushing assembly (63).

CAUTION: Do not oil motor bearings unless absolutely necessary. Excess oil will be thrown off, causing slippage of pulley and rollers. When necessary to oil bearings, use as little oil as possible. Wipe any oil from pulleys and rollers with a petroleum solvent such as alcohol. Do not use carbon tetrachloride.

AMPLIFIER ADJUSTMENT

The following adjustments should be made whenever circuit components are replaced or repaired.

These adjustments must be made with set turned on and in Record position with no signal input.

1. Adjust oscillator coil (L2) for 52.5-kc reading on frequency meter.

2. Adjust meter (R3) until needle rests directly over black dot at left side of meter. With meter (R3) properly adjusted, needle should move slightly when set is turned on and off.

3. To adjust 52.5-kc trap (L1), volume must be set at maximum. Adjust trap (L1) for minimum 52.5-kc reading at external amplifier jack.

4. Set hum adjust (R4) for minimum reading across load at external speaker jack with volume and treble set at maximum.

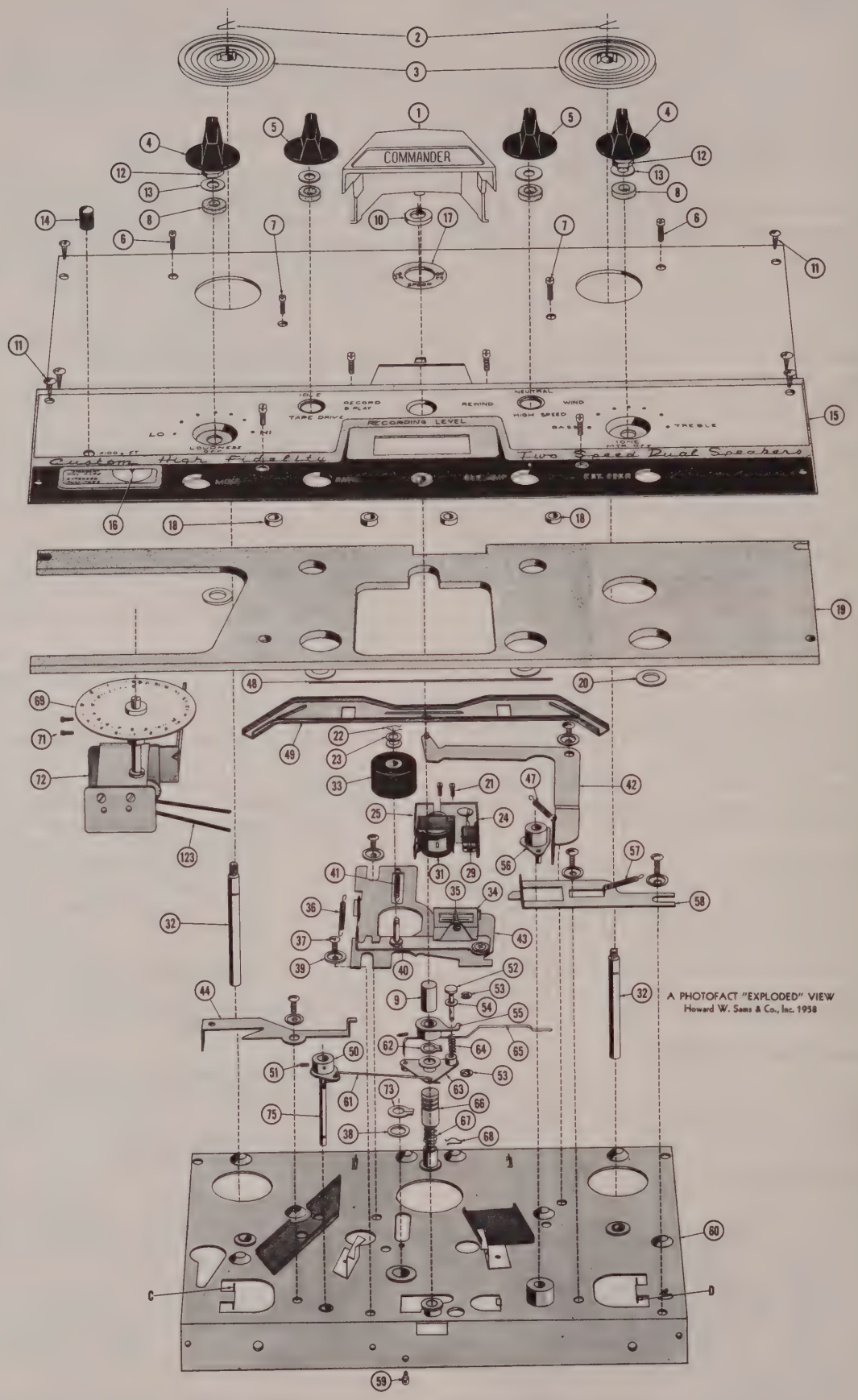


FIG. 3A EXPLODED VIEW OF PARTS ABOVE BASEPLATE

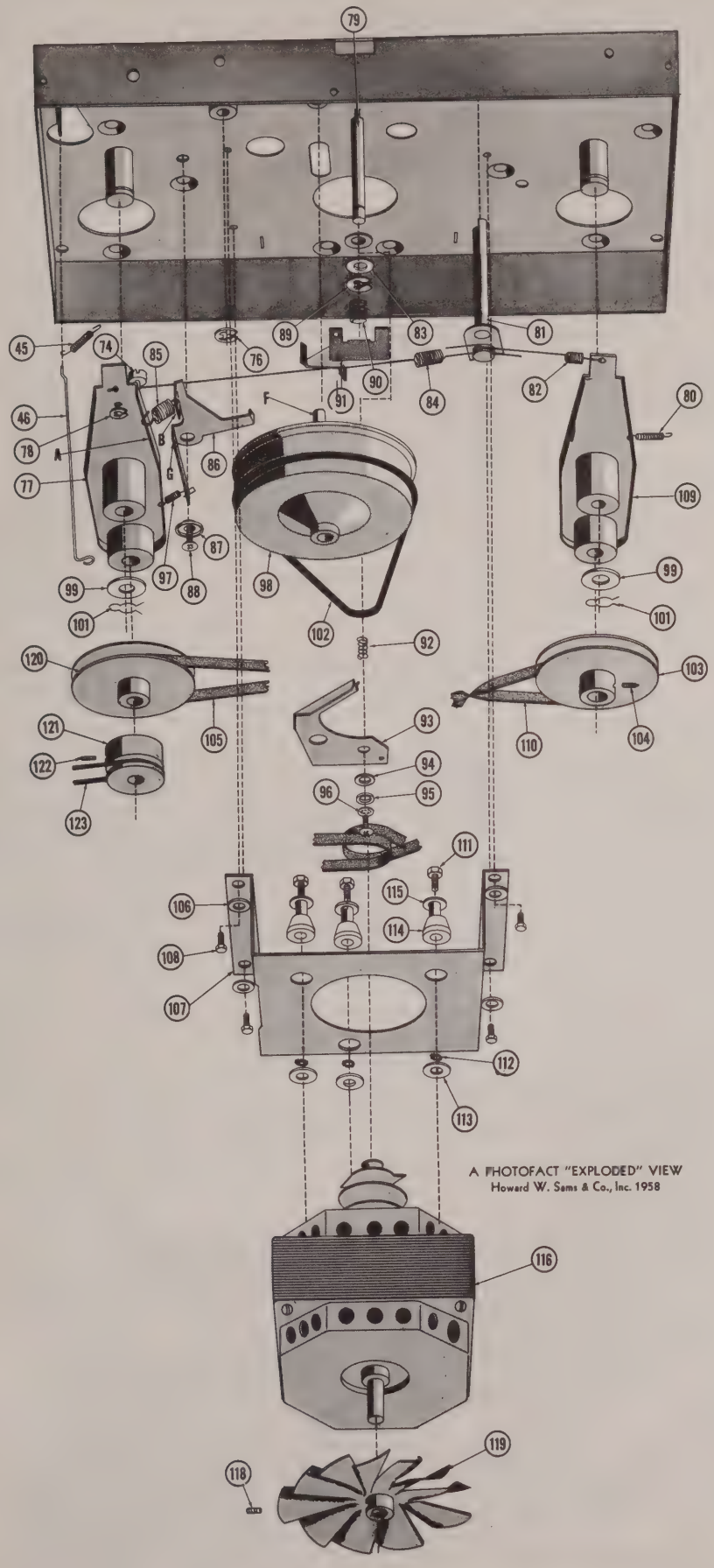


FIG. 3B EXPLODED VIEW OF PARTS BELOW BASEPLATE

TROUBLE CHART

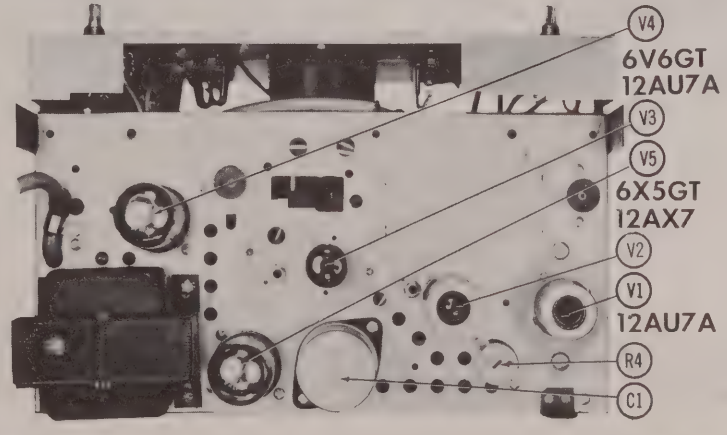
Symptom	Cause	Remedy
Will not take up tape properly.	1. Spindle (32) binding.	1. Lubricate.
	2. Drive belt (110) slipping.	2. Clean motor pulley, and take-up pulley and flange (103).
	3. Drive belt (110) broken.	3. Remove motor and lug assembly bracket (107) and replace drive belt (110).
	4. Set screw is loose in take-up pulley and flange (103).	4. Tighten leaving 1/32" to 1/16" end play in spindle.
	5. Take-up pulley and flange (103) broken.	5. Replace take-up pulley and flange (103).
Fast forward will not function properly.	1. See previous cause, except Step 2.	1. See previous remedy, except Step 2.
Fast rewind will not function properly.	1. Spindles (32) binding.	1. Lubricate.
	2. Drive belt (110) slipping.	2. Clean motor pulley, and take-up pulley and flange (103).
	3. Drive belt (110) broken.	3. Remove motor and lug assembly bracket (107) and replace drive belt (110).
	4. Set screw is loose in rewind pulley (120).	4. Tighten, leaving 1/32" to 1/16" end play in spindle.
	5. Rewind pulley (120) broken.	5. Replace pulley (120).
Speed variation or wow.	1. Dirty motor pulley, flywheel and shaft (98), and pressure roller (33), causing slippage.	1. Clean with a petroleum solvent, not carbon tetrachloride. If pressure roller (33) is oil-soaked, replace.
	2. Feed reel out of adjustment, causing too much feed reel drag.	2. Check adjustments as described under "Take-up Tension Adjustment."
	3. Flat spot on pressure roller (33), causing a rapid thumping sound while unit is running.	3. Replace pressure roller (33).

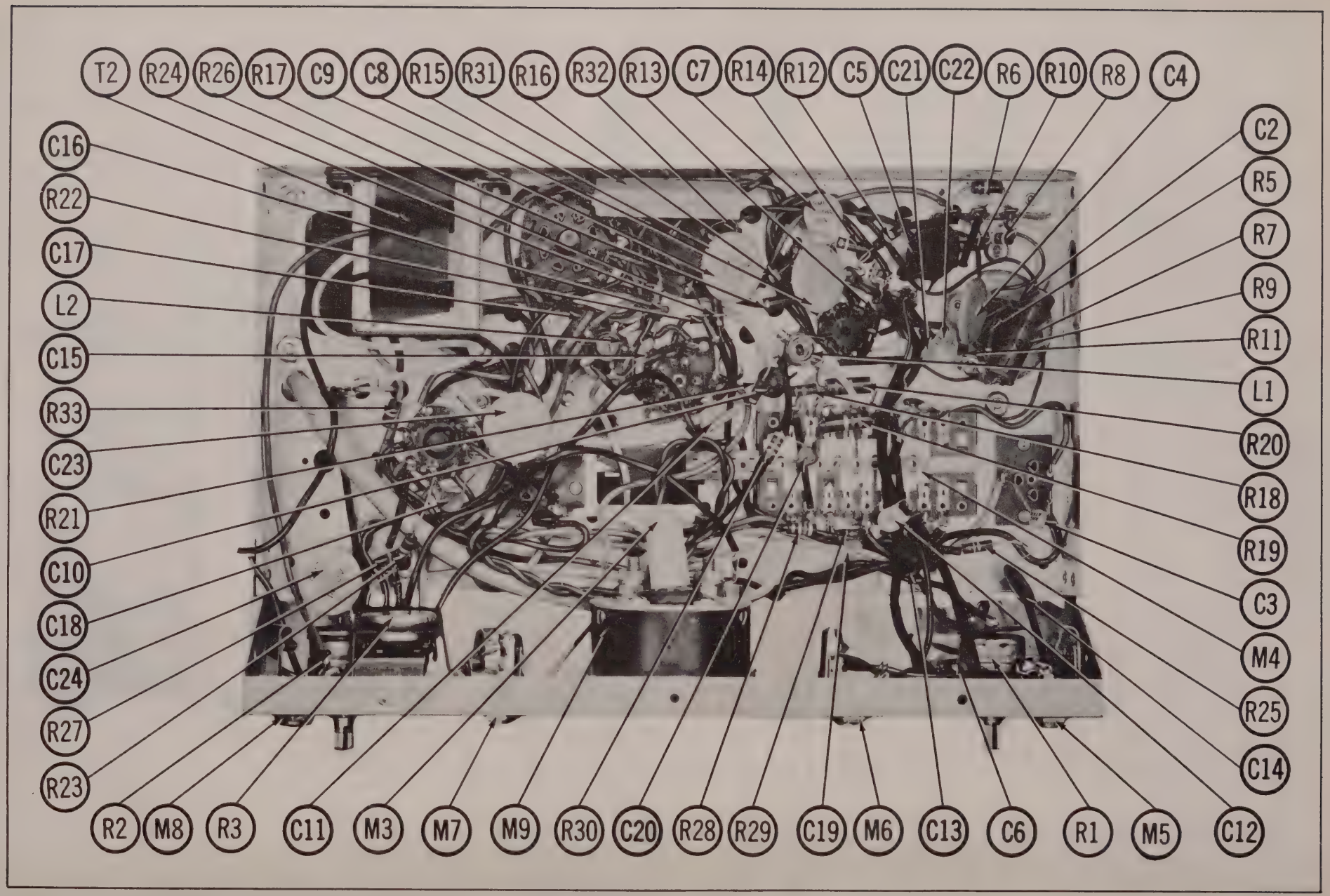
MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	21-264-0	Tape Head Cover
2	22-110-0	Reel Plate Retainer
3	84-3437	Reel Plate Ass'y.
4	52-1051-0	Off-On, Loudness, Tone-Motor Knob
5	52-1050-0	Play-Record, Fast Forward-Rewind Knob
6	57-606611	#6-32 x 3/8" Phil. Rd. Hd. Mach. Screw
7	97-600	#6-32 x 3/16" Phil. Rd. Hd. Mach. Screw
8	86-307	Flatwasher
9	52-833-0	Record-Edit Button
10	86-270	Rubber Washer
11	97-599	#6 x 1/2" Phil. Rd. Hd. Wood Screw
12	56-230	#3/8-32 Hex Nut
13	86-308	Flatwasher
14	52-802-0	Indicator Footage Knob
15	84-4743	Top Cover Ass'y.
16		Window Dial
17		Speed Control Indicator Escutcheon
18	77-9-0	Spacer
19	44-20-0	Top Cover Baffle
20	86-265	Fibre Washer
21	97-569	#6-32 x 1/4" Phil. Bd. Hd. Screw
22	22-40-1	Retainer
23	86-282	Cloth Washer
24	84-4640	Head Ass'y.
25	11-1115	Head Mounting Bracket
26	84-3423	Ground Wire & Lug
27	86-295	Flatwasher
28	57-203111	#2-56 x 3/16" Screw
29	33-273-0	Erase Head
30	45-4-0	3 Prong Plug
31	84-4739	Play-Record Head
32	84-3404	Spindle Ass'y.
33	39-1-5	Pressure Roller Ass'y.

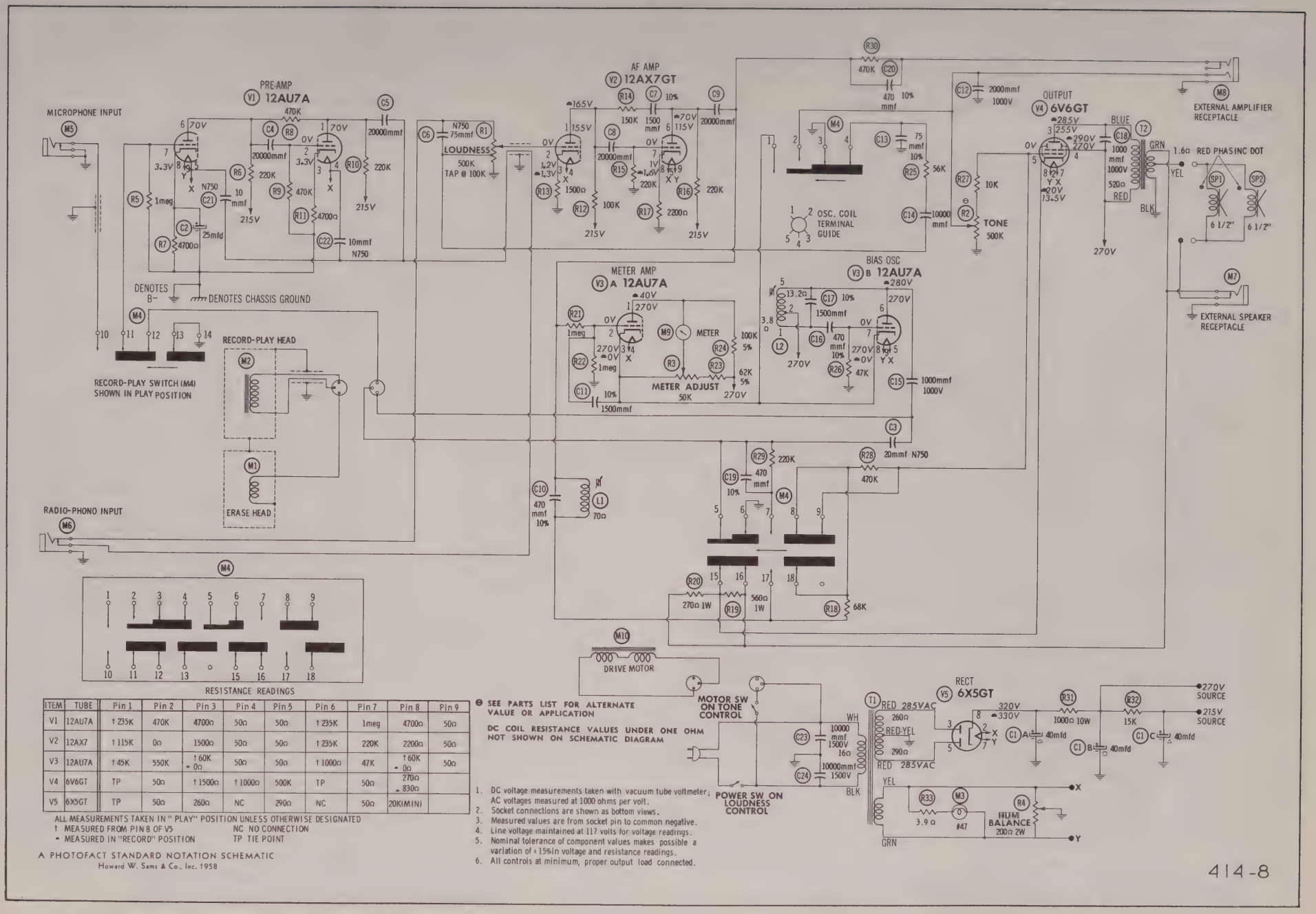
Ref. No.	Part No.	Description
34	84-3401	Pressure Shoe Ass'y.
35	70-253-0	Pressure Shoe Spring
36	70-258-0	Pressure Roller Spring
37	97-573	#6-32 x 1/4" Phil. Fil. Hd. Screw
38	86-372	Capstan Washer
39	72-135	Slide Button
40	84-3408	Pressure Roller Arm Ass'y.
41	70-251-0	Slide Return Spring
42	84-3455	Brake Lever & Pin Ass'y
43	84-3458	Pressure Plate & Spring Ass'y.
44	22-15-4	Foot Switch Lever
45	70-244-0	Foot Switch Return Spring
46	39-5-3	Foot Switch Linkage Wire
47	70-251-0	Return Spring
48	70-264-0	Brake Plate Spring
49	29-114-1	Brake Plate
50	84-3439	Motion Cam Ass'y.
51	97-577	#6-32 x 3/8" Slab Hd. "Cone Pt." Set Screw
52	72-134	Plunger
53	22-44-1	Retainer
54	86-302	Flatwasher
55	84-3443	Catch Ass'y.
56	84-3442	Hub Ass'y.
57	70-267-0	Return Spring
58	22-16-4	Interlock Lever
59	97-569	#6-32 x 1/4" Phil. Bd. Hd. Screw
60	84-3461	Motorboard Ass'y.
61	22-20-4	Drive Link Wire
62	22-52-1	Retainer
63	84-3728	Cam & Bushing Ass'y.
64	70-263-0	Plunger Spring
65		Take-up Brake Rod (Part of Ref. 63)
66	84-3405	Plunger Knob & Shaft Ass'y.
67	70-259-0	Compression Spring
68	70-256-0	Plunger Detent Spring
69	84-3396	Dial Ass'y.
70	62-81-0	"O" Ring
71	97-566	#6-32 x 1/4" Hex Hd. Screw, Special
72	39-1-2	Indicator
73	22-37-1	Retainer
74	39-1-0	Foot Switch Adjustment Cam
75	39-6-3	Motion Shaft (Left)
76	22-38-1	Retainer
77	84-3452	Take-up Reel Arm Ass'y.
78	22-46-1	Spring Washer

Ref. No.	Part No.	Description
79	39-9-3	Control Shaft
80	70-252-0	Brake Spring (Right)
81	84-3446	Cam & Stud Ass'y. Shaft
82	70-324-0	Tape Tension Spring (Right)
83	86-288	Rubber Washer
84	70-325-0	Tape Tension Spring (Left)
85	70-250-0	Take-up Spring
86	22-13-4	Take-up Lever
87	72-135	Slide Button
88	97-573	#6-32 x 1/4" Phil. Fl. Hd. Screw
89	22-45-1	Retainer
90	70-265-0	Control Shaft Return Spring
91	84-3465	Edit Lever Ass'y. Bracket
92	70-259-0	Compression Spring
93	22-14-4	Belt Transfer Fork
94	86-284	Flatwasher
95	86-284	Flatwasher
96	86-45	#6 Int. Tooth Lockwasher
97	70-257-0	Brake Spring (Left).
98	84-3466	Flywheel & Shaft Ass'y.
99	86-290	Flatwasher
100	86-290	Flatwasher
101	22-42-1	Hairpin Retainer
102	62-79-0	Flywheel Belt
103	84-3406	Take-up Pulley & Flange Ass'y.
104	97-577	#6-32 x 3/8" Slab Hd. Set Screw
105	62-78-0	Drive Belt
106	86-294	Flatwasher
107	84-3407	Motor & Lug Ass'y. Bracket
108	97-567	#8-32 x 3/16" Hex Hd. Screw
109	84-3450	Feed Reel Arm Ass'y.
110	62-78-0	Drive Belt
111	97-574	#8-32 x 5/8" Hex Hd. Screw
112	86-293	#8 Int. Tooth Lockwasher
113	86-292	Flatwasher
114	62-74-0	Rubber Grommet
115	62-123	Eyelet
116	84-3457	Motor, Plug & Pulley Ass'y.
117	45-4-0	3 Prong Plug
118	97-619	#8 x 3/16" Cup Pt. "Allen Hd." Set Screw
119	84-4240	Fan, Hub & Set Screw Ass'y.
120	84-3431	Rewind Pulley & Flange Ass'y.
121	39-4-1	Footage Meter Pulley
122	97-572	#6-32 x 1/2" Slab Hd. "Cone Pt." Set Screw
123	62-80-0	Drive Belt





AMP CHASSIS - BOTTOM VIEW



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AU7A	†235K	470K	4700Ω	50Ω	50Ω	†235K	1meg	4700Ω	50Ω
V2	12AX7	†115K	0Ω	1500Ω	50Ω	50Ω	†235K	220K	2200Ω	50Ω
V3	12AU7A	†45K	550K	†60K ▪ 0Ω	50Ω	50Ω	†1000Ω	47K	†60K ▪ 0Ω	50Ω
V4	6V6GT	TP	50Ω	†1500Ω	†1000Ω	500K	TP	50Ω	270Ω ▪ 830Ω	
V5	6X5GT	TP	50Ω	260Ω	NC	290Ω	NC	50Ω	20K(MIN)	

ALL MEASUREMENTS TAKEN IN " PLAY" POSITION UNLESS OTHERWISE DESIGNATED
† MEASURED FROM PIN 8 OF V5 — NC NO CONNECTION
▪ MEASURED IN "RECORD" POSITION — TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1958

❸ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

414-8

TOWER
MODEL 4691

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Preamplifier	12AU7A	
V2	AF Amplifier	12AX7	
V3	Meter Amp. -Bias Osc.	12AU7A	
V4	Output	6V6GT	
V5	Rectifier	6X5GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	TOWER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	350	18-36-3		D0032	FP420.35	TMQ-12	D-167	R2478 *
B	■40	300			BR3035	TC77	TMS-37	MT-4540	
C	▲40	300							
C2	25	25	18-52-5	PRS25V25	BBR25-25	TC-26	TD-25-25	MT-0225	TVA-1205

* Non-Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	TOWER PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C3	20		15-20011	N750-DI20	DTN-20	C10Q2U		5TCU-Q2	N750
C4	20000		15-20316	BPD-02	DD-203	BYB6S2		5HK-S2	
C5	20000		15-20316	BPD-02	DD-203	BYB6S2		5HK-S2	
C6	75		15-75011	N750-DI75	DTN-75	C10Q75U		5TCU-Q75	N750
C7	1500		15-15211			1R5D15		MS-215	10%
C8	20000		15-20316	BPD-02	DD-203	BYB6S2		5HK-S2	
C9	20000		15-20316	BPD-02	DD-203	BYB6S2		5HK-S2	
C10	470		15-47111		D6-471	5R5T47		MS-347	10%
C11	1500		15-15211			LR5D15		MS-215	10%
C12	2000	1000	15-20226		DD-202	BYA10D2		5GA-D2	
C13	75		15-75011	NP0-DI75	DTZ-75	C10Q75C		5TCC-Q75	10%
C14	10000		15-10316	BPD-01	DD-103	BYA6S1		5HK-S1	
C15	1000	1000	15-10226	HVD-15-1000	DD-102	BYA10D1	DC3021	5GA-D1	
C16	470		15-47111			5R5T47		MS-347	10%
C17	1500		15-15211	1464-0015		1R5D15		MS-215	10%
C18	1000	1000	15-10226	HVD-15-1000	DD-102	BYA10D1	DC3021	5GA-D1	
C19	470		15-47111		D6-471	5R5T47		MS-347	10%
C20	470		15-47111		D6-471	5R5T47		MS-347	10%
C21	10		15-10011	N750-DI10	DTN-10	C10Q1U	NT-541	5TCU-Q1	N750
C22	10		15-10011	N750-DI10	DTN-10	C10Q1U	NT-541	5TCU-Q1	N750
C23	10000	1500	20-75-0	DAC-27	DD16-103	HVE16S1		BL-S10	
C24	10000	1500	20-75-0	DAC-27	DD16-103	HVE16S1		BL-S10	

CONTROLS

ITEM No.	RATING RESIST-ANCE	RATING WATTS	TOWER PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	24-271-0	BT-66	A47F3-500K	Q13-133X	UT-427	Loudness, Tap@100K
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	Power On-Off
R2A	500K	½	24-143-0	B-60	A47-500K-Z	Q-13-133X	U48	Tone Note 1.
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
C	Switch			KB-1 or KR-1*	SWE-12	76-1	US-26	Motor On-Off
R3	50K	½	24-3-3	BX-31				Meter Adj.
R4	200Ω	2(WW)	24-1-3					Hum Balance

* Use KR with CRL "Red Label" controls and KB with "Blue Label" controls.
Note 1. Part #24-143-2 may be used in some versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	TOWER PART No.	NOTES
R5	1meg		60-10501	
R6	220K		60-22401	
R7	4700Ω		60-47201	
R8	470K		60-47401	
R9	470K		60-47401	
R10	220K		60-22401	
R11	4700Ω		60-47201	
R12	100K		60-10401	
R13	1500Ω		60-15201	
R14	150K		60-15401	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	TOWER PART No.	NOTES
R15	220K		60-22401	
R16	220K		60-22401	
R17	2200Ω		60-22201	
R18	68K		60-68302	
R19	560Ω	1	60-56111	
R20	270Ω	1	60-27111	
R21	1meg		60-10501	
R22	1meg		60-10501	
R23	62K 5%		60-62305	
R24	100K 5%		60-10405	
R25	56K		60-56301	
R26	47K		60-47301	
R27	10K		60-10302	
R28	470K		60-47401	
R29	220K		60-22401	
R30	470K		60-47401	
R31	1000Ω	10WW	61-106	
R32	15K		60-15302	
R33	3.9Ω		60-39901	

COILS (RF-IF)

ITEM No.	USE	TOWER PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	52.5KC Trap	10-9-5					
L2	Bias Osc.	10-33-4					

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	TOWER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .38A	560VCT @ .060A	6.3V @ 2A	80-3-0		P-3048①			22R01 ①	R-5B①

① Use original shields.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	TOWER PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	5000Ω	3-4Ω Tap@ 1-2Ω	80-3-16	Z1001	A-2902①	AU-608	A-3850	24S64①	S-51X	①Drill new mounting hole.

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	TOWER PART No.	QUAM PART No.	NOTES
SP1	6½"	PM	3-4Ω	33-309-4	6A21	
SP2	6½"	PM	3-4Ω	33-309-4	6A21	

MISCELLANEOUS

ITEM No.	PART NAME	TOWER PART No.	NOTES
M1	Erase Head	33-273-0	(#8015A)
M2	Record-Play Head	84-4739	Includes Adaptor
M3	Lamp	89-7	Meter Light, #47
M4	Switch	69-241-0	Record-Play, Slide Type
M5	Jack	45-2-1	Mike, Shorting Type
M6	Jack	45-2-1	Radio-Phono, Shorting Type
M7	Jack	45-2-1	External Speaker, Shorting Type
M8	Jack	45-1-1	External Amplifier, 2 Circuit Type
M9	Meter	83-1115	
M10	Motor	84-3457	Includes Plug and Pulley Ass'y.
	Microphone	33-39-1	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

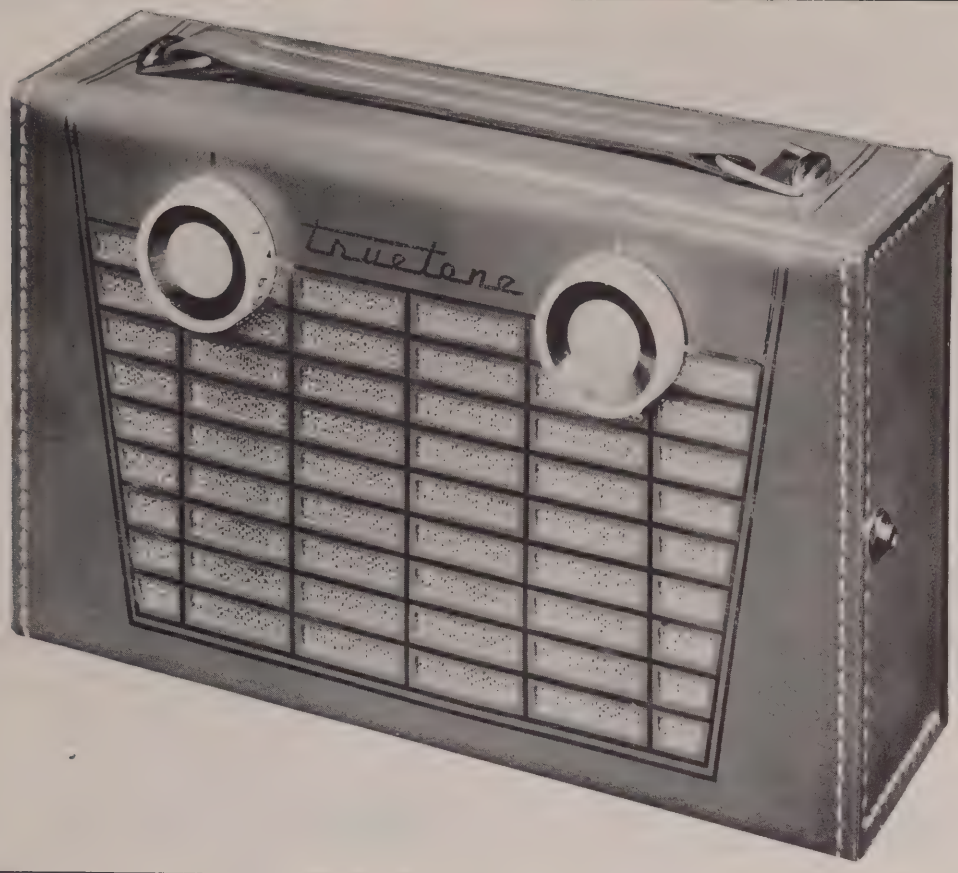
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting) .....Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

TRUETONE MODEL D3716B



TRUETONE MODEL D3716B

TRUETONE MODEL D3716B

TRADE NAME	Truetone Model D3716B
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	Battery Operated Portable AM Transistorized Receiver
POWER SUPPLY	6 Volts DC RATING 8 MA @ 6 Volts DC
TUNING RANGE—BROADCAST	540-1620KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05mfd	Across loop stick secondary.	455KC (400~ Mod)	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output.
2.		Loop	1620KC	"	"	A3	"
3.		"	535KC	Tuning gang fully closed	"	A4	"
4.		"	1400KC	1400KC	"	A5	"

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana . Printed in U.S. of America

H379

SET 414 FOLDER 9

PARTS LIST AND DESCRIPTIONS

TRUETONE MODEL D3716B

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N140	Converter		2N140	2N485		
X2	2N139	IF Amplifier		2N139	2N483		
X3	2N109	AVC-AF Amp.	2N180	2N109	2N362	2N35	
X4	2N109	Output	2N180	2N109	2N360	2N35	
X5	2N109	Output	2N180	2N109	2N360	2N35	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	100	6	045-200371	PWE6100	NL100-6	TT6X100	ML100-6		*R2562
C2	10	2	045-300438	XPP-3010	NL10-3	TT3X10	ML10-6		TE-1053
C3	3	2	045-300437	XPP-3003	NL3-6	TT6X2	ML4-6		TE-1082
C4	30	2	045-300436	XPP-3030	NL30-6	TT6X30	ML30-6		TE-1092

* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	TRUETONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	10000		047-100354	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C6	10000		047-100354	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C7	5		475-101050-25	NPO-SI 5	TCZ-5		TCO-5			NPO 5%
C8	18		475-105180-15		TCZ-18		TCO-18			NPO 5%
C9	.047	400	477-022473	P488N-047	DF-503	CUB4S47		GEM-4147	4TM-S47	
C10	.047	200	477-022473	P288N-047	DF-503	CUB2S47		GEM-4147	2TM-S47	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	TRUETONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	10K	½	025-201405	B-12	A47-10K-Z	Q13-116	U18	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1 *	SWE-12	76-1	US-26	

* Use KR-1 on red label control only.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

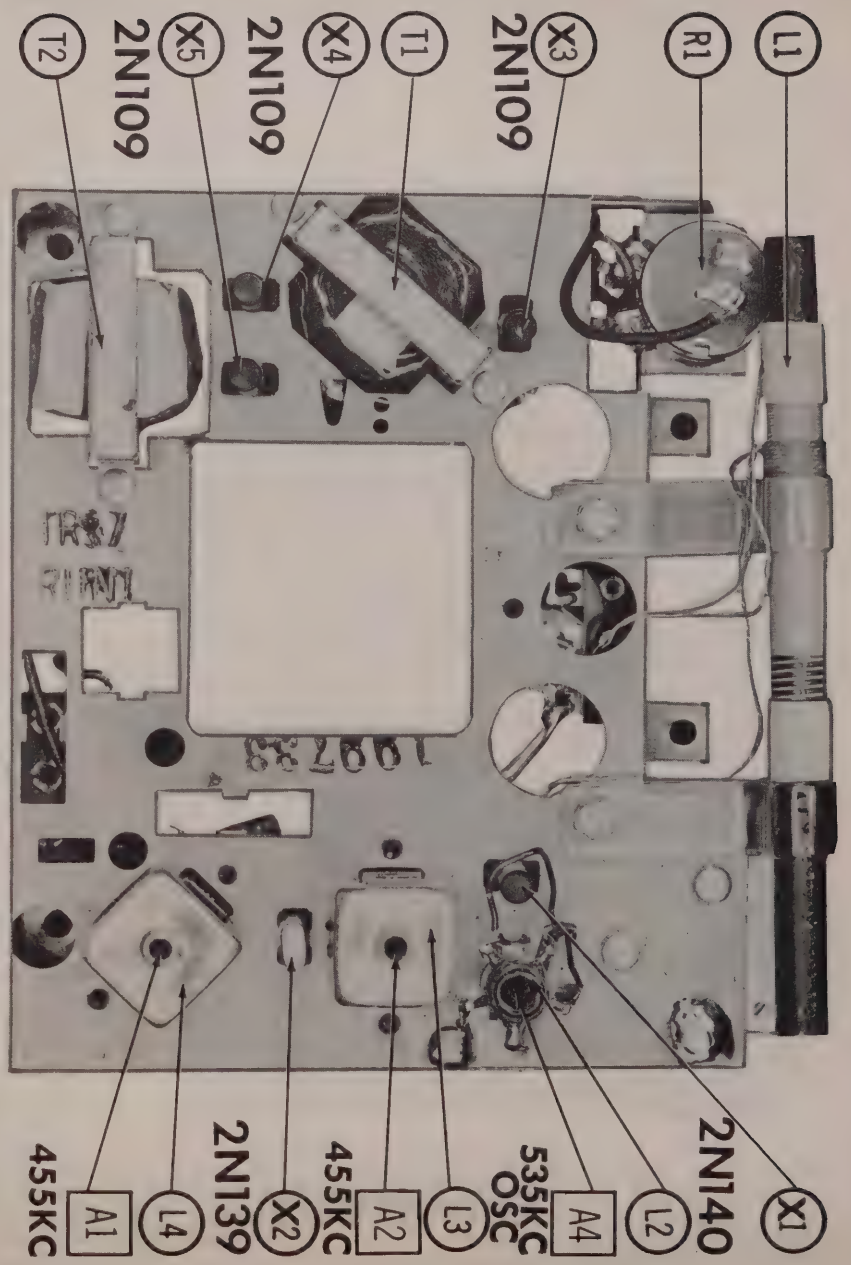
ITEM No.	RATING		TRUETONE PART No.	NOTES
	OHMS	WATT		
R2	100K		451-252104	
R3	15K		451-252153	
R4	5600Ω 5%		451-252562	
R5	470Ω		451-252471	
R6	8200Ω		451-252822	
R7	68K		451-252683	

ITEM No.	RATING		TRUETONE PART No.	NOTES
	OHMS	WATT		
R8	12K		451-252123	
R9	470Ω		451-252471	
R10	2700Ω		451-252272	
R11	82Ω		451-252820	
R12A	8.2Ω		224-100008	
B	8.2Ω		224-100008	

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.7	1	55-324 ①				TR-66 ②		① Alternate part #050-300324 ② Use original channel mtg. frame and tape center tap on primary.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: TRUETONE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	465Ω CT	16Ω	55-325 ①							① Alternate part #055-300325

SPEAKER

ITEM No.	TYPE: SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA: TRUETONE PART No.	QUAM PART No.	NOTES
SP1	4"	PM	16Ω	285-200008	4A01Z16	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: TRUETONE PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Loop Stick	257-300004	14-9013				
L2	Osc. Coil	251-200010	14-9010	BC-403			
L3	Input IF	250-300008					
	Input IF	050-300703					Alternate
L4	Output IF	250-300009					
	Output IF	050-300704					Alternate

BATTERIES

ITEM No.	VOLTAGE	TRUETONE PART No.	REPLACEMENT DATA: BURGESS "A"	BURGESS "B"	EVEREADY "A"	EVEREADY "B"	MALLORY "A"	MALLORY "B"	RAY-O-VAC "A"	RAY-O-VAC "B"	NOTES
M1	1.5V		2R		950		M-13		2LP		4 Required.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: TRUETONE PART No.	CBS PART No.	SYLVANIA PART No.	NOTES
M2	1N60	019-201933	1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M3	Tuning Cap.	248-300002	2 Gang (Ant. 12-160mmf, Osc. 12-95mmf)

CABINETS & CABINET PARTS

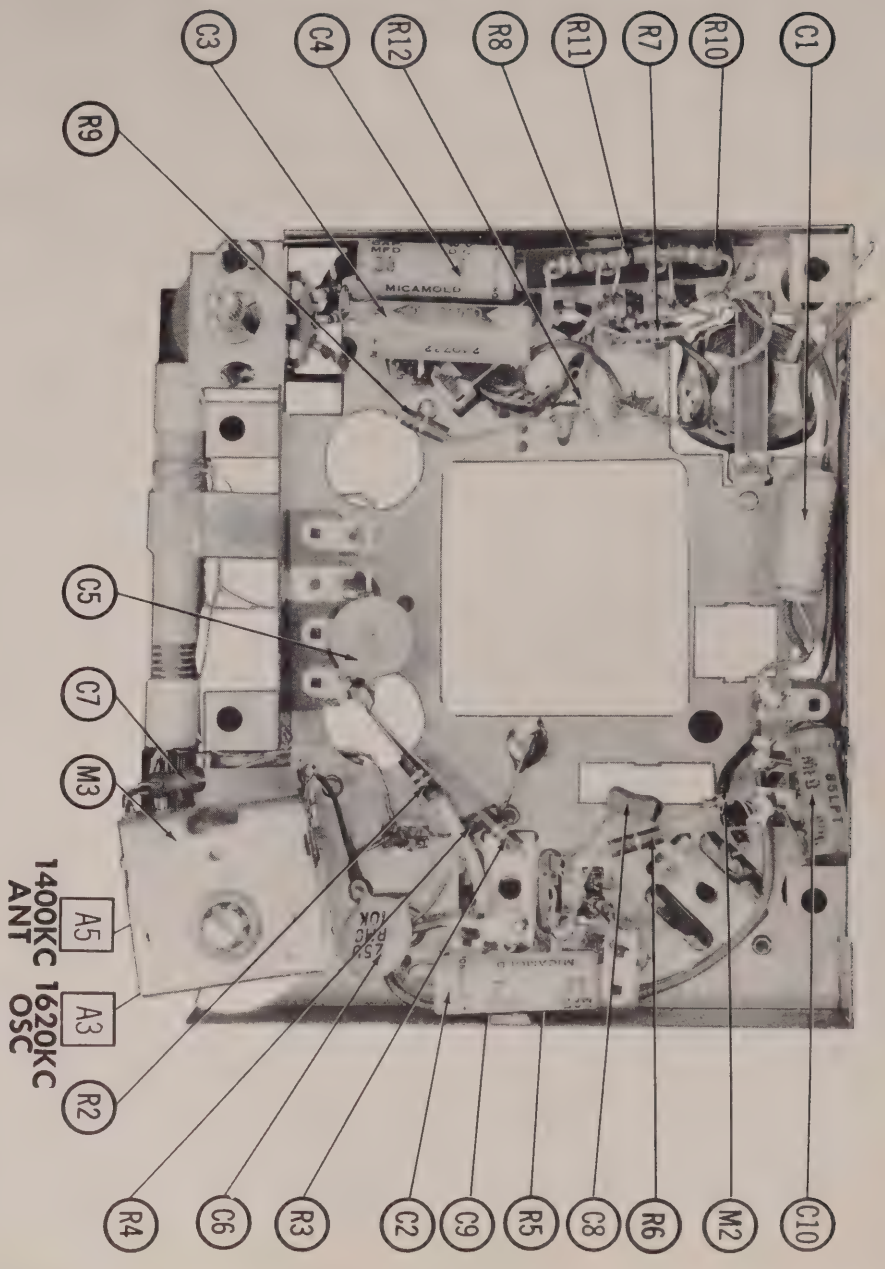
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

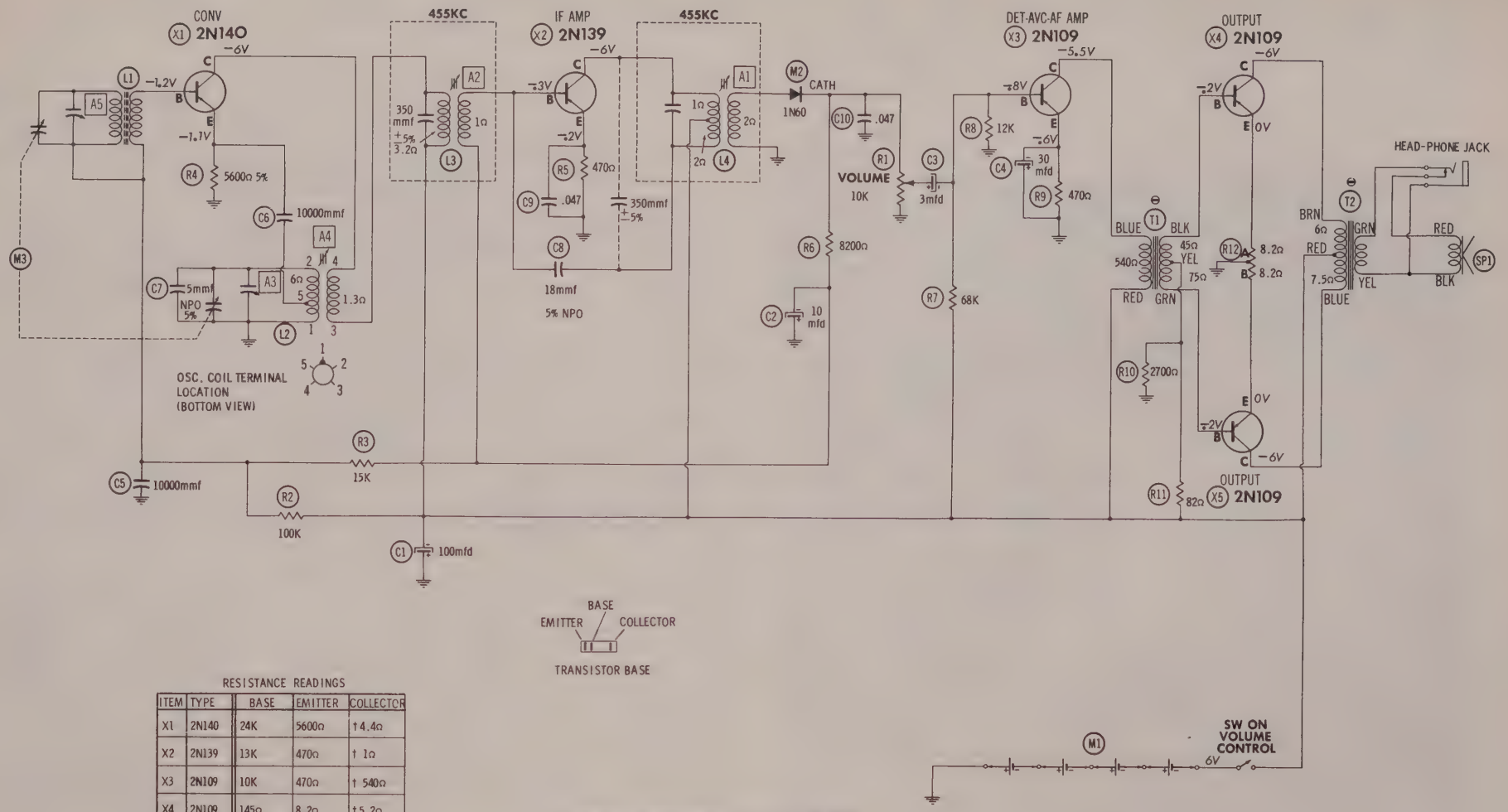
NAME	PART NO.	DESCRIPTION
Knob	215-300060	Tuning
Knob	015-301019	On-Off-Volume
Cabinet	278-100027	

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

ITEM	TYPE	BASE	EMITTER	COLLECTOR
X1	2N140	24K	5600Ω	†4.4Ω
X2	2N139	13K	470Ω	† 1Ω
X3	2N109	10K	470Ω	† 540Ω
X4	2N109	145Ω	8.2Ω	†5.2Ω
X5	2N109	120Ω	8.2Ω	†6.5Ω

TRANSISTORS REMOVED FOR RESISTANCE MEASUREMENTS.
† MEASURED FROM JUNCTION OF C1 AND R2.

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Measured values are from socket pin to common negative.
3. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
4. Volume control at maximum, no signal apllied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC

© Howard W. Sams & Co., Inc. 1958

PHOTOFACT* Folder

with CIRCUITRACE*

V-M MODELS 557, 562, 566, 568

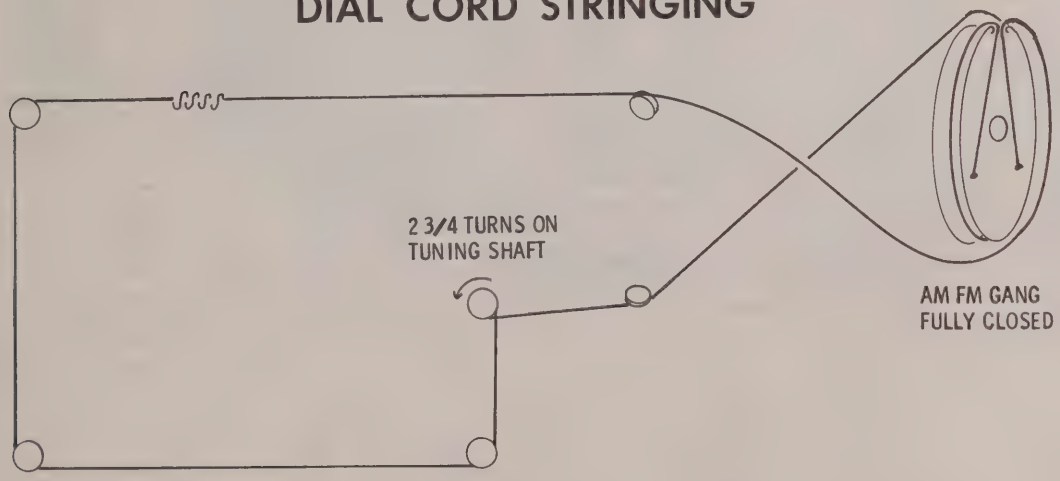
V-M MODELS 557, 562, 566, 568

MODEL 568

TRADE NAME	V-M Models 557, 562, 566, 568		
MANUFACTURER	V-M Corp., Benton Harbor, Michigan		
TYPE SET	AC Operated FM-AM Tuner, Amplifier and 4 Speed Automatic Record Changer		
TUBES	Tuner: Seven Amp: Five		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING	.94A @ 117 Volts AC (97 Watts) FM
TUNING RANGE—BROADCAST	535-1620KC	FREQ. MOD.	88-108MC

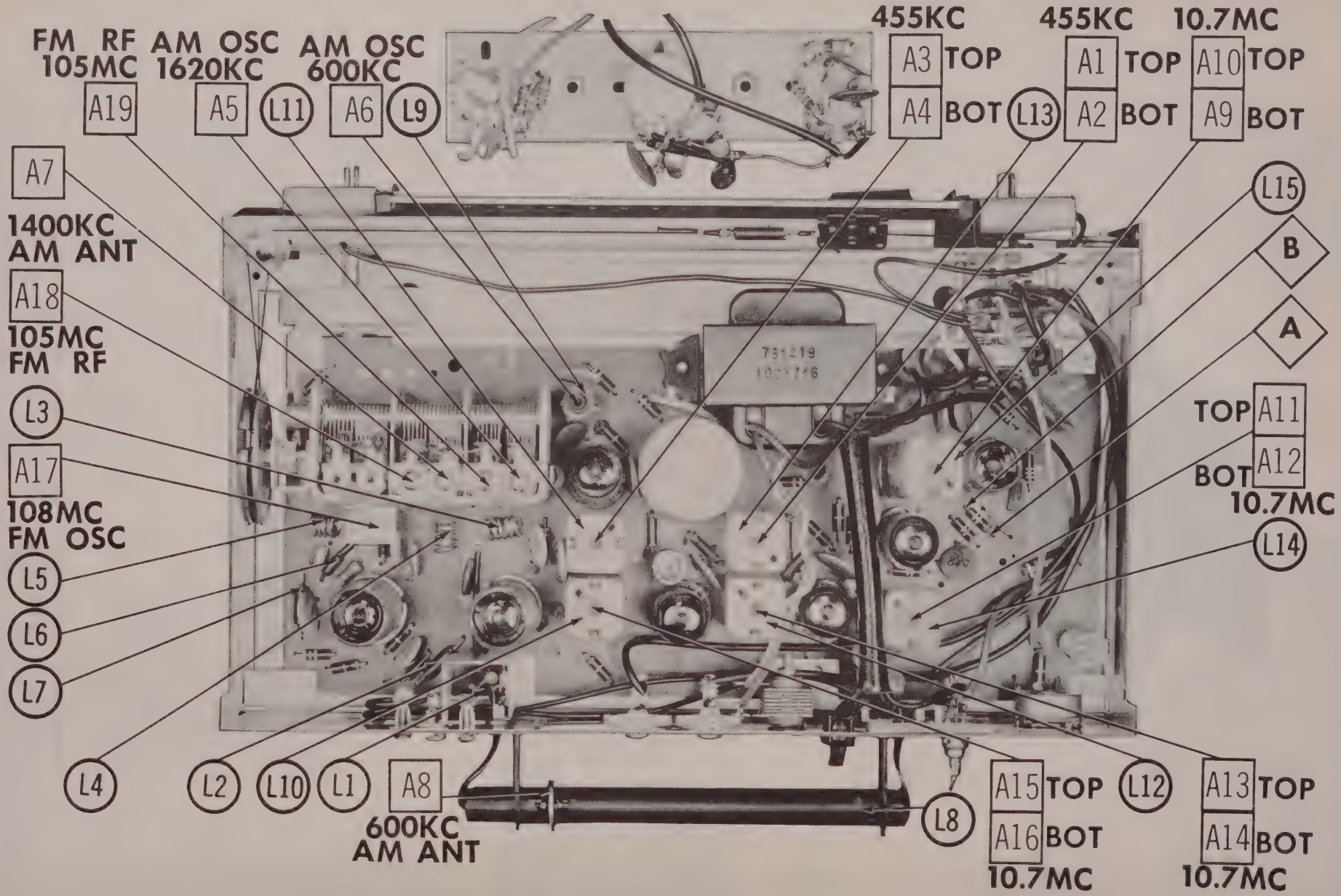
FOR SERVICE INFORMATION ON RECORD CHANGER—SEE V-M 1200A- PHOTOFACT SET 353 FOLDER 16 OR RECORD CHANGER MANUAL RC-10

DIAL CORD STRINGING



HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1958 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America



TUNER CHASSIS TOP VIEW -ALIGNMENT & INDUCTOR IDENT

ALIGNMENT INSTRUCTIONS

PRE ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01mfd	High side to pin 7 (grid) of 6BE6 (V3). Low side to chassis.	455KC (400∿ Mod.)	AM	Tuning gang fully open.	Across voice coil.	A1, A2 A3, A4	Adjust for maximum output.
2.	"	High side to AM antenna terminal. Low side to chassis.	1620KC	"	"	"	A5	"
3.	"	"	600KC	"	600KC	"	A6	Adjust for maximum output while rocking tuning gang.
4.	"	"	1400KC	"	Tune for 1400KC signal.	"	A7	Adjust for maximum output.
5.	"	"	600KC	"	600KC	"	A8	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	200mmf	High side to pin 1 (grid) of 6AU6 (V6). Low side to chassis.	10.7MC (Unmod.)	FM	Point of non-interference	DC probe to point (A). Common to chassis.	A9	Adjust for maximum deflection.
7.	"	"	"	"	"	DC probe to point (B). Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
8.	"	High side to pin 7 (grid) of ECC85 (V1). Low side to chassis.	"	"	"	DC probe to point (A). Common to chassis.	A11, A12, A13, A14 A15, A16	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	200mmf	High side to pin 1 (grid) of 6AU6(V6). Low side to chassis.	10.7MC (450KC SWP)	FM	Point of non-interference	Vert. Amp. to point (A). Low side to chassis.	A9	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
7.	"	"	"	"	"	Vert. Amp to point (B). Low side to chassis.	A10	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2 SLIGHTLY retouch A9 for maximum amplitude and straightness of cross-over lines.
8.	"	High side to pin 7 (grid) of ECC85 (V1). Low side to chassis.	"	"	"	Vert. Amp. to point (A). Low side to chassis.	A11, A12 A13, A14 A15, A16	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
9.	270Ω Carbon Resistor	High side thru 270Ω to FM antenna terminal. Low side to chassis.	108MC	FM	108MC	DC probe to point (A). Common to chassis.	A17	Adjust for maximum deflection.
10.	"	"	88MC	"	88MC	"	L5	Adjust for maximum deflection by compressing or expanding coil turns. Repeat Steps 9 & 10.
11.	"	"	105MC	"	Tune for 105 MC signal.	"	A18, A19	Adjust for maximum deflection.
12.	"	"	90MC	"	Tune for 90MC signal.	"	L4, L3	Adjust for maximum deflection by compressing or expanding coil turns. Repeat Steps 9, 10, 11, and 12.

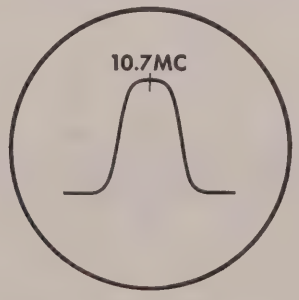


FIG. 1

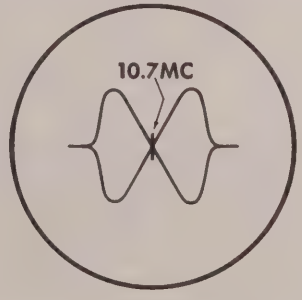
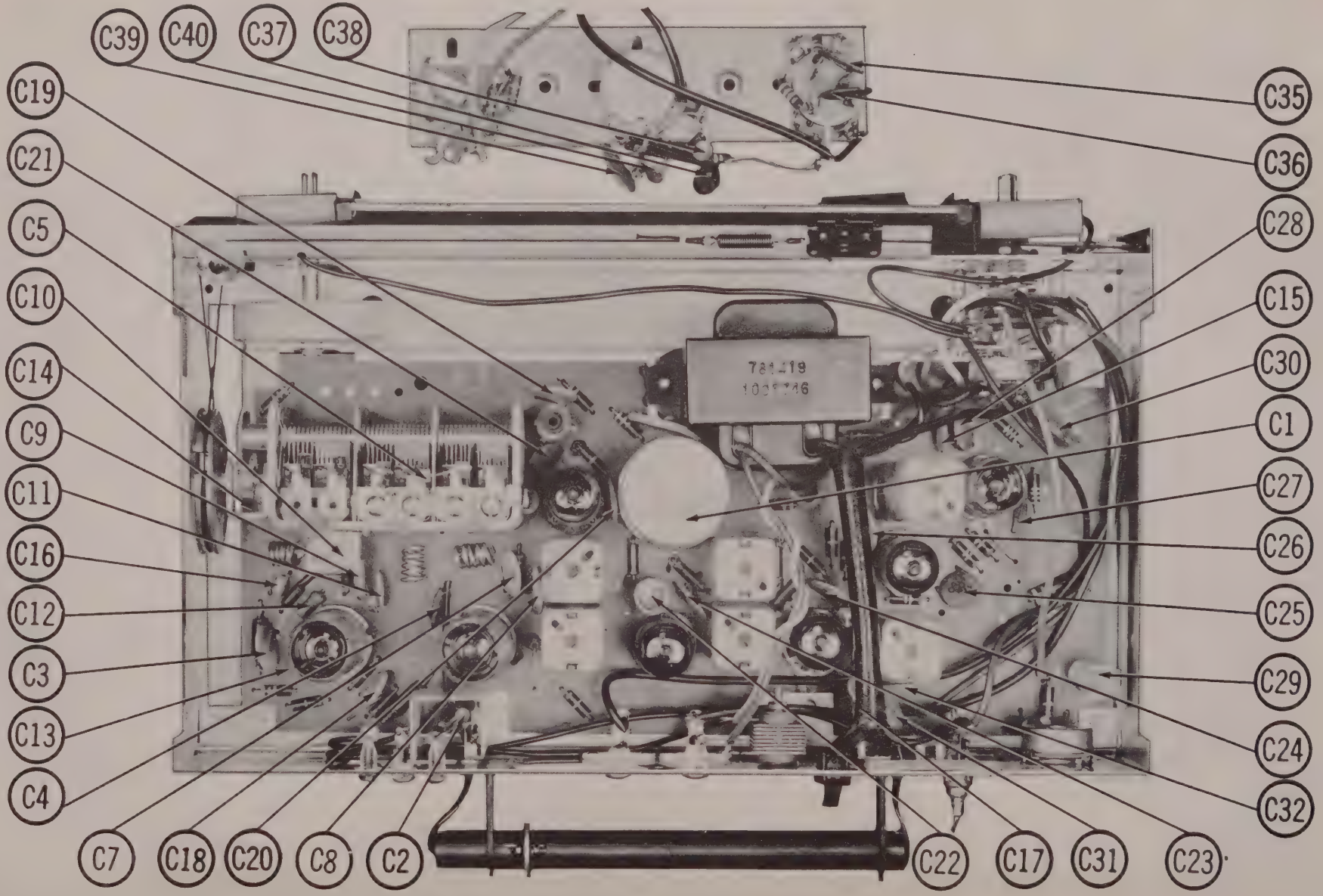
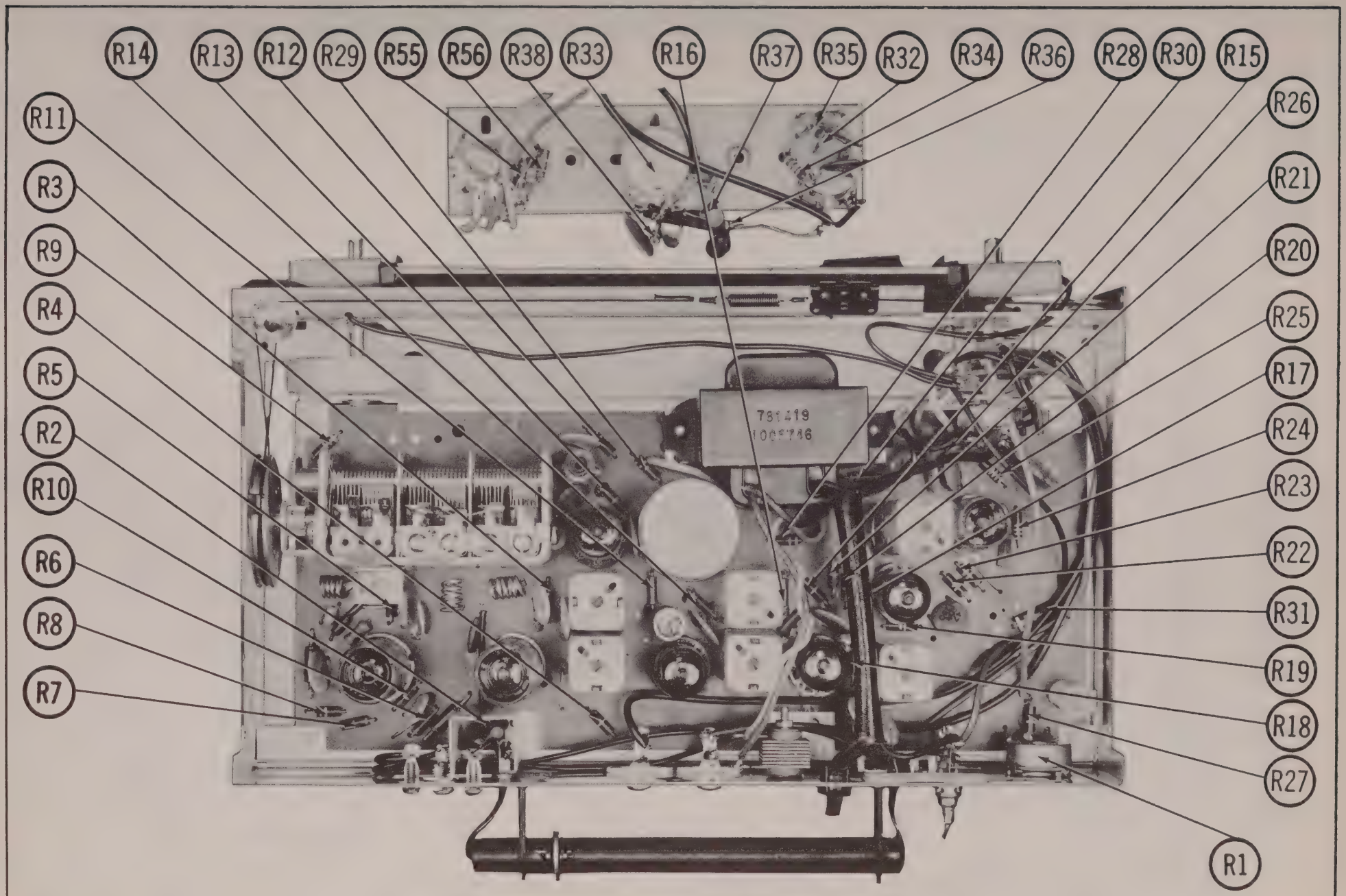


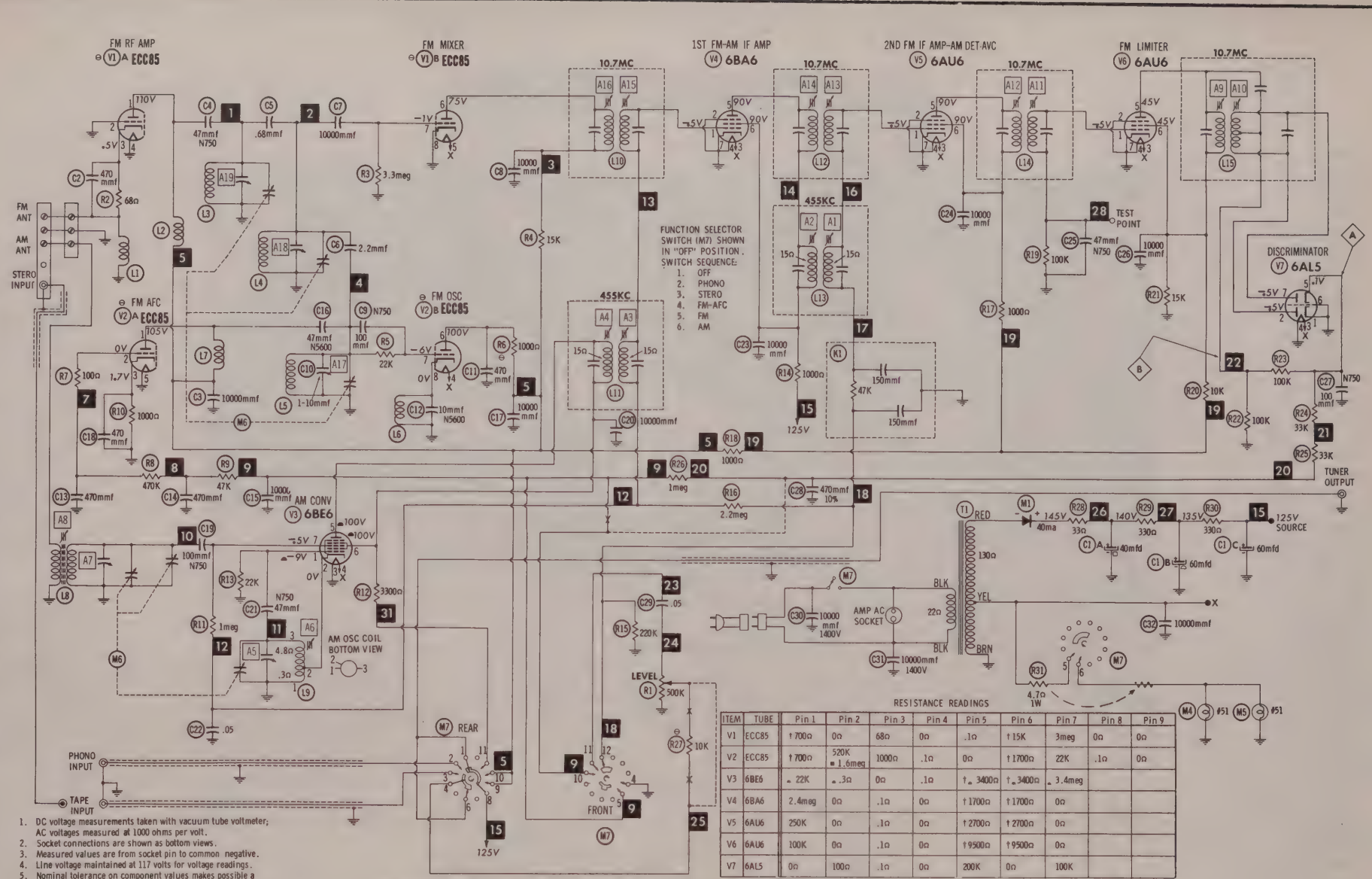
FIG. 2



TUNER CHASSIS - CAPACITOR IDENTIFICATION



TUNER CHASSIS - RESISTOR IDENTIFICATION



ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC85	†700Ω	0Ω	68Ω	0Ω	.1Ω	†15K	3meg	0Ω	0Ω
V2	ECC85	†700Ω	520K ▪ 1.6meg	1000Ω	.1Ω	0Ω	†1700Ω	22K	.1Ω	0Ω
V3	6BE6	▵ 22K	▵ .3Ω	0Ω	.1Ω	†▵ 3400Ω	†▵3400Ω	▵ 3.4meg		
V4	6BA6	2.4meg	0Ω	.1Ω	0Ω	†1700Ω	†1700Ω	0Ω		
V5	6AU6	250K	0Ω	.1Ω	0Ω	†2700Ω	†2700Ω	0Ω		
V6	6AU6	100K	0Ω	.1Ω	0Ω	†9500Ω	†9500Ω	0Ω		
V7	6AL5	0Ω	100Ω	.1Ω	0Ω	200K	0Ω	100K		

RESISTANCE READINGS

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
† MEASURED FROM OUTPUT OF M1
▵ MEASURED IN "AM" POSITION
▪ MEASURED IN FM-AFC POSITION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE® TRADE MARK

©Howard W. Sams & Co., Inc. 1958

Ⓢ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

414-10

TUNER SCHEMATIC

TUNER PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE
V1	FM RF Amp. -FM Mixer	ECC85/ 6AQ8①
V2	FM Osc. -FM AFC	ECC85/ 6AQ8①
V3	AM Converter	6BE6
V4	1st FM-AM IF Amplifier	6BA6
V5	2nd FM IF Amp. - AM Det. -AVC	6AU6
V6	FM Limiter	6AU6
V7	Discriminator	6AL5

①Domestic type listed may not be directly interchangeable in some instances.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA V-M PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■40	150	12102						PCL-3443
B	▲60	150							
C	60	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA V-M PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	470		12093	SI470	D6-471	LT6T47	UC-5347	5GA-T47	
C3	10000		12096	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C4	47		12094	N750-DI47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750
C5	.68		12095	NP0-SI. 68	TCZ-R68				
C6	2. 2		12099	NP0-SI2. 2	TCZ-2R2	CTA6V22C		5TCCB-V22	
C7	10000		12096	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C8	10000		12096	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C9	100		12097	N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C10	1-10		12100						
C11	470		12093	BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C12	10		12098						N5600
C13	470		12093	BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C14	470		12093	BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C15	10000		12105	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C16	47		12094						N5600
C17	10000		12096	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C18	470		12093	BPD-00047	DD-471	L10T47	UC-5347	5GA-T47	
C19	100		12097	N750-DI 100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C20	10000		12096	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C21	47		12094	N750-DI47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750
C22	.05	200	12101	P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	
C23	10000		12096	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C24	10000		12096	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C25	47		12094	N750-DI47	DTN-47	C10Q47U	NT-5447	5TCU-Q47	N750
C26	10000		12096	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C27	100		12097	N750-DI100	DTN-100	C10T1U	NT-531	5TCU-T1	N750
C28	470		12104		MD-471				10%
C29	.05	200	12101	P288N-05	DF-503	CUB2S5	GEM-415	2TM-S5	
C30	10000	1400	12103	DAC-27		HVE16S1		20HKB-S1	
C31	10000	1400	12103	DAC-27		HVE16S1		20HKB-S1	
C32	10000		12096	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	

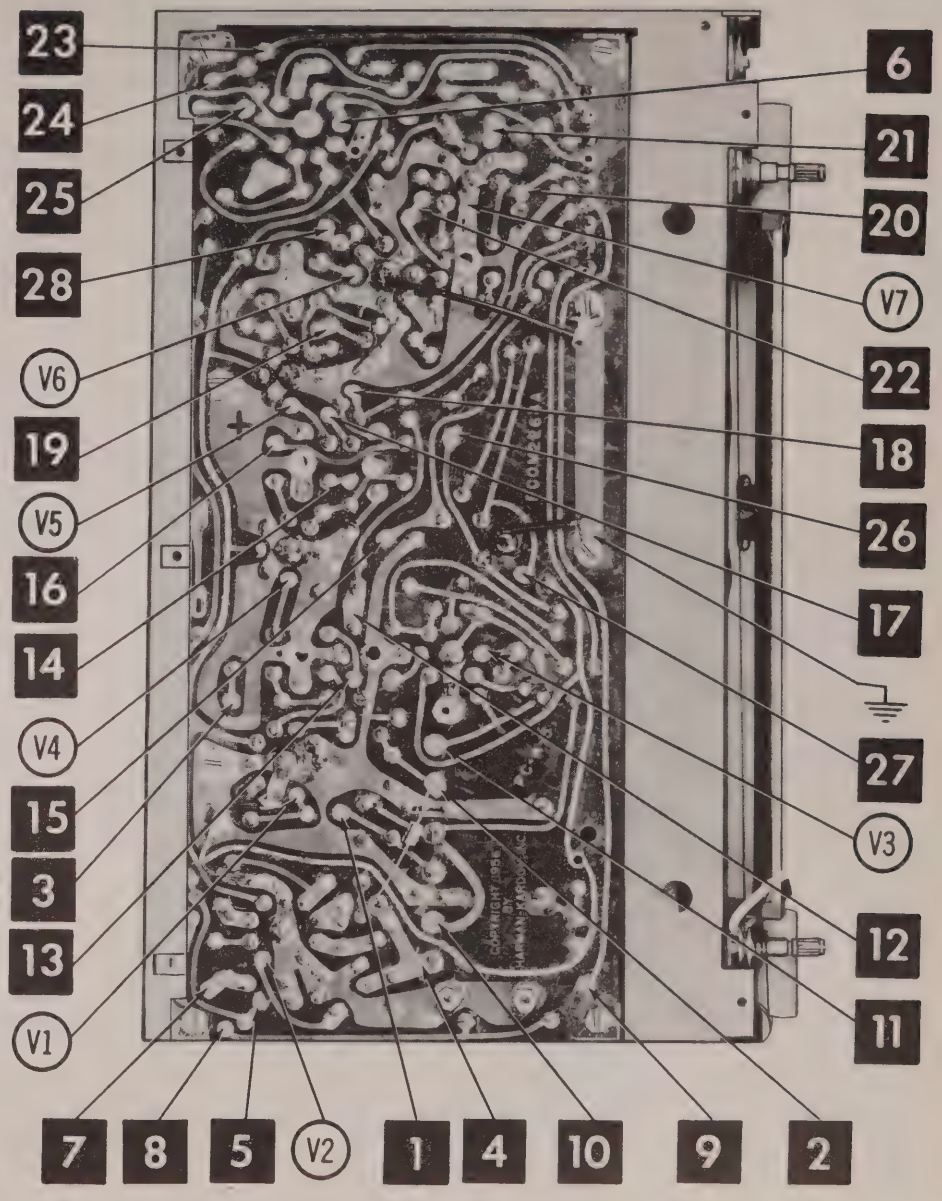
CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA V-M PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	RVCOM2380	AB-60	A47-500K-Z	B13-133	TA55A	Level
B	Shaft			AK-1	FKS-1/ 4	SK2	Not Req.	

TUNER PRINTED BOARD

A Howard W. Sams CIRCUITRACE* Photo
*TRADE MARK

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



TUNER PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	V-M PART No.	NOTES
R2	68Ω		10543	
R3	3.3meg		11573	
R4	15K		11013	
R5	22K		11053	
R6	1000Ω		10733	Note 1
R7	100Ω		10493	
R8	470K		11373	
R9	47K		11133	
R10	10000Ω		10733-10	
R11	1meg		11453	
R12	3300Ω		10853	
R13	22K		11053	
R14	1000Ω		10733	
R15	220K		11293	
R16	2.2meg		11533	

ITEM No.	RATING OHMS	RATING WATT	V-M PART No.	NOTES
R17	1000Ω		10733	
R18	1000Ω		10733	
R19	100K		11213-10	
R20	10K		10973	
R21	15K		11013	
R22	100K		11213-10	
R23	100K		11213-10	
R24	33K		11093-10	
R25	33K		11093-10	
R26	1meg		11453	
R27	10K		10973	Note 2
R28	33Ω		10373	
R29	330Ω		10613	
R30	330Ω		10613	
R31	4.7Ω	1	10174	

Note 1. Some versions may use 6800Ω in this application (Part #10933)
Note 2. Not used in some versions.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA V-M PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	FM Ant. Coil	GC28831			4584		.24 microhenry
L2	RF Choke	GC481454					3.3 microhenries
L3	FM RF Coil	GL781543					
L4	FM Mixer Coil	GL781543					
L5	FM Osc. Coil	GL781544					
L6	Cathode Choke	GC24602	19-1000	BC-561	4602		1 microhenry
L7	RF Choke	GC481454					3.3 microhenries
L8	Loop Stick	GL781479					
L9	AM Osc. Coil	GL1121988					
L10	1st FM IF	GT781993	16-3490		1463-PC		
L11	1st AM IF	GT782122	16-6780	BC-356	13-PC1	RF-4	
L12	2nd FM IF	GT781994	16-3490		1463-PC		
L13	2nd AM IF	GT782123	16-6780	BC-357	13-PC2	RF-4	
L14	3rd FM IF	GT781995	16-3490		1463-PC		
L15	Discriminator	GR782124					

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA V-M PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .33A	120V @ .037A Tap @ 6.3V @ 2.45A		FT781419B						

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	V-M PART No.	REPLACEMENT DATA	
K1	Diode RF Filter	150mmf, 150mmf, 47K	PC781599	Aerovox	PA-98
				Centralab	PC-51
				Cornell-Dubilier	111TM2
				Sprague	D-2

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA V-M PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.039A	Z1362133	1234AH	RS065	65 M150 ①	①Silicon Type

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA V-M PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. MOUNT	REMARKS
M2	①	81-TBX		56DS	PT-2	Model 568 ①Some versions may use cartridge Part#14877D and needle Part #16618
	14456	89-TB		56	PT-2	Models 562, 566
	16729-A	89-TB		56	PT-2	Model 557

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA V-M PART No.	JENSEN PART No.	WALCO PART No.	REMARKS
M3	①			Model 568 ①Some versions may use needle Part #16618
	14472	† S-66 or †♦ S-66SD or ♦ S-66D	† W-77TPS or †♦ W-77DS or ♦ W-77TPD	Models 562, 566
		† S-66 or †♦ S-66SD or ♦ S-66D	† W-75TPS or †♦ W-75DS or ♦ W-75TPD	Model 557

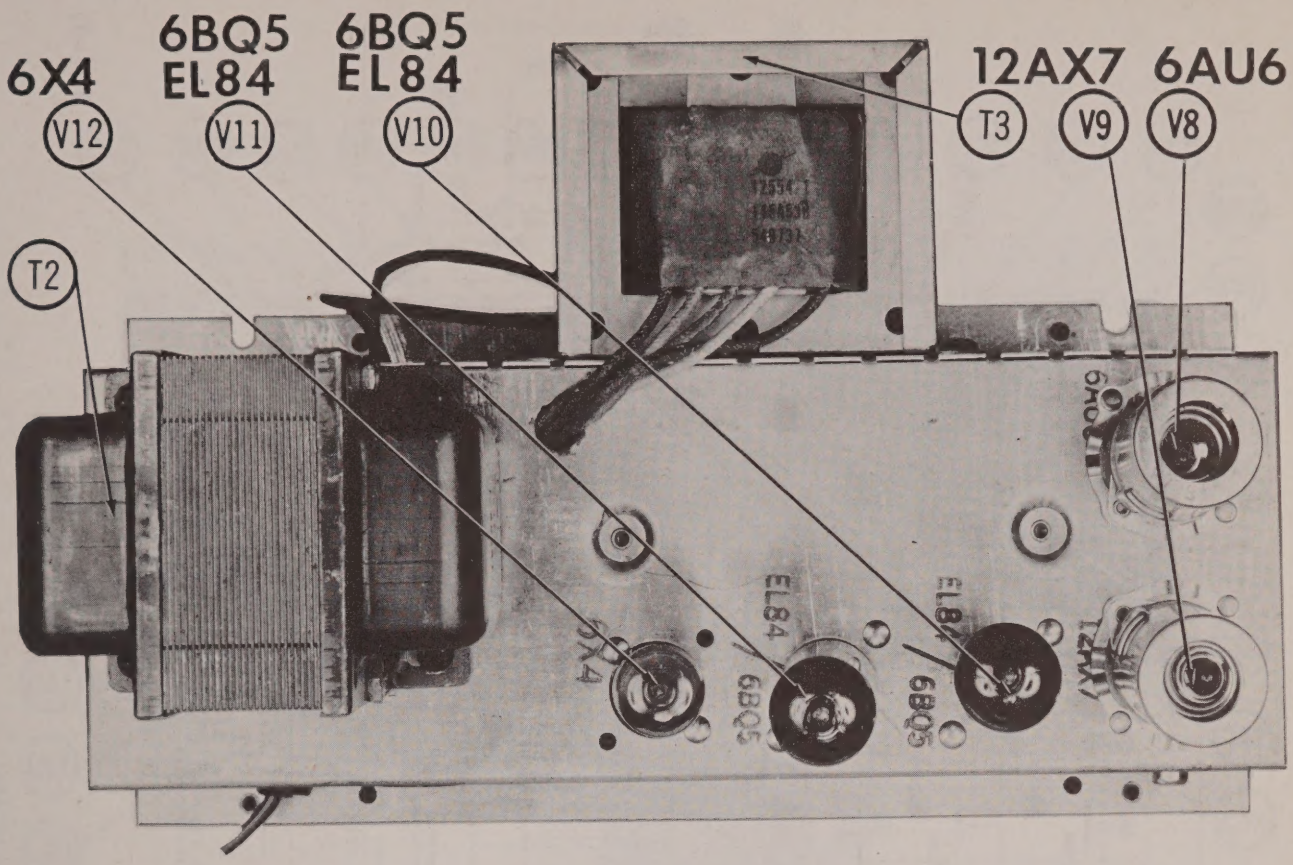
* Metal † Jewel ♦ Diamond

MISCELLANEOUS

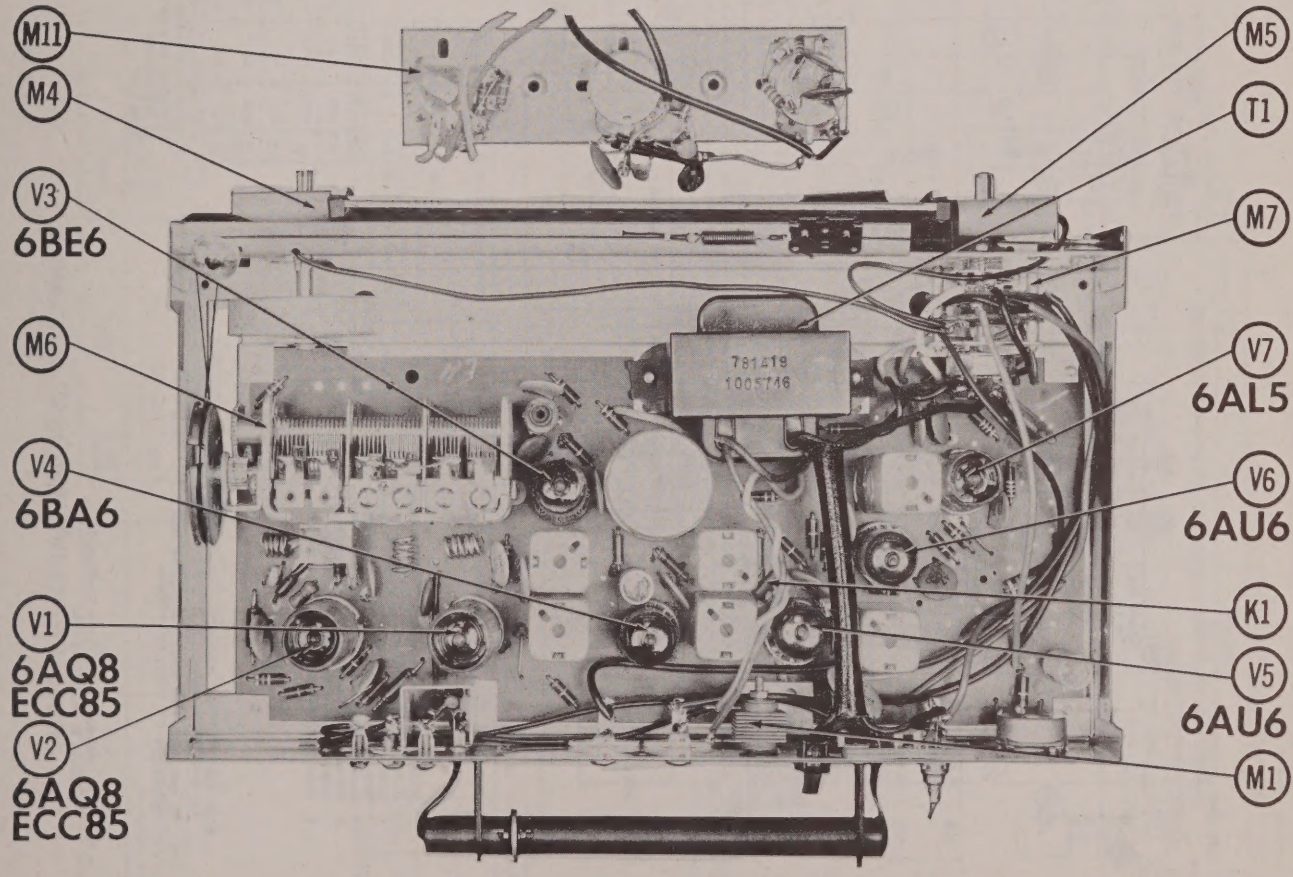
ITEM No.	PART NAME	V-M PART No.	NOTES
M4	Lamp	ZCOM2219	#51
M5	Lamp	ZCOM2219	#51
M6	Tuning Cap.	JV811553	3 Gang, AM, FM
M7	Switch	ER1792432	Function, Rotary Wafer, Incl. Rotary Snap Type
	Printed Board	PCOM2264	

WIRING DATA

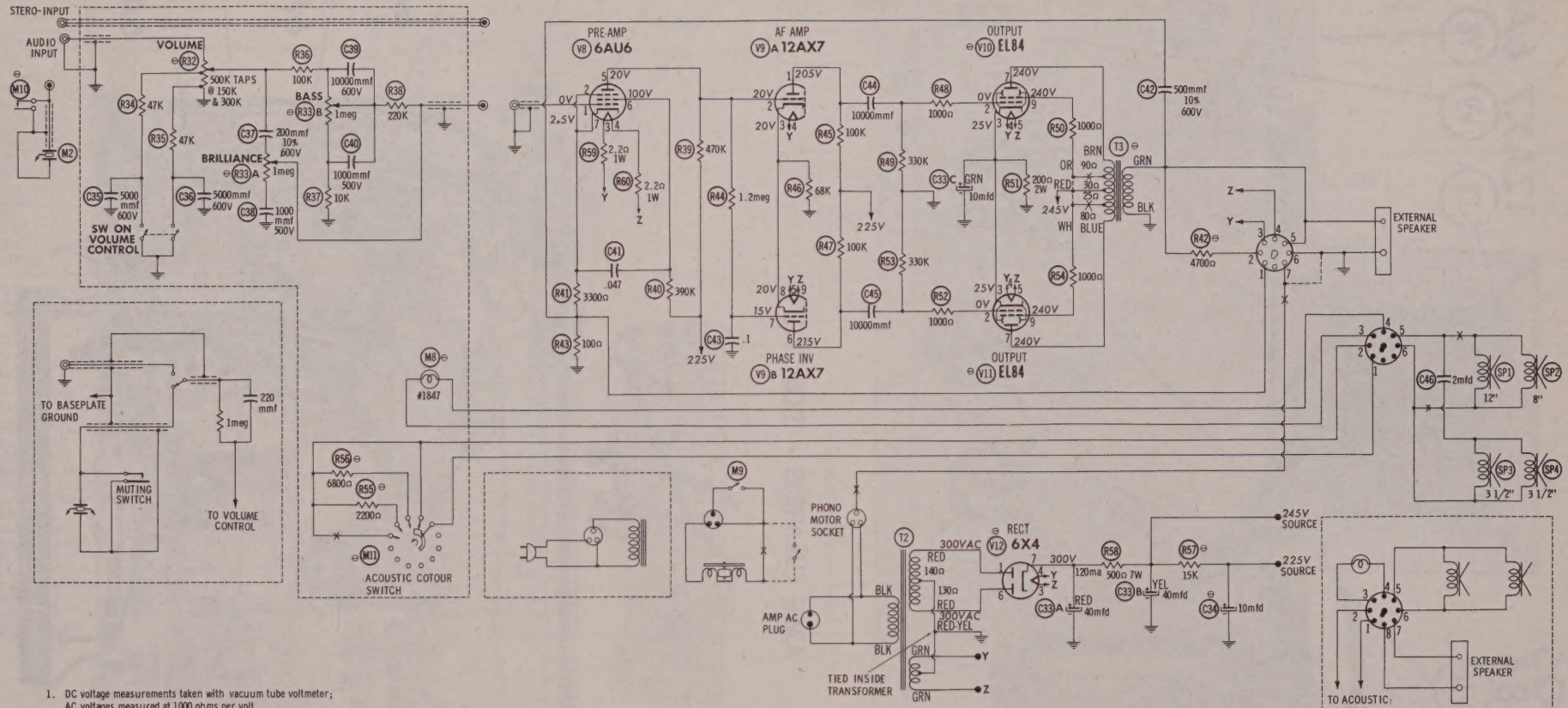
General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)..... Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)



AMP CHASSIS - TOP VIEW



TUNER CHASSIS - TOP VIEW



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V8	6AU6	230K	3400Ω	3Ω	3.1Ω	††485K	††400K	3400Ω		
V9	12AX7	††115K	††485K	68K	1Ω	1Ω	††115K	†††1.6meg	68K	.2Ω
V10	EL84	NC	330K	200Ω	1.1Ω	1.3Ω	NC	††620Ω	TP	††1500Ω
V11	EL84	NC	330K	200Ω	1.1Ω	1.3Ω	TP	††605Ω	TP	††1500Ω
V12	6X4	140Ω	NC	1.3Ω	1.1Ω	TP	130Ω	¶		

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
†† MEASURED FROM PIN 7 OF V12
NC NO CONNECTION
TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC
©Howard W. Sams & Co., Inc. 1958

414-10

AMP SCHEMATIC

AMP PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE
V8	Pre Amplifier	6AU6
V9	AF Amp. -Phase Inv.	12AX7
V10	Output	EL84/6BQ5①
V11	Output	EL84/6BQ5①
V12	Rectifier	6X4 ②

①Domestic type listed may not be directly interchangeable in some instance.
②Some versions may use type EZ81/6BW4 in this application.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA V-M PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C33A	40	450	12107	PR4-185	BBRD4445	WQ775		T-680	R1412*
B	40	450			BBR10-25				
C	10	25							
C34	10	400	12106 ①	PRS450V10	BR1045	TC72	TD-10-450	MT-4510	TVA-1705

①Some versions may use C34 as part of C33 (C33 Part #12087)
* Non-Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

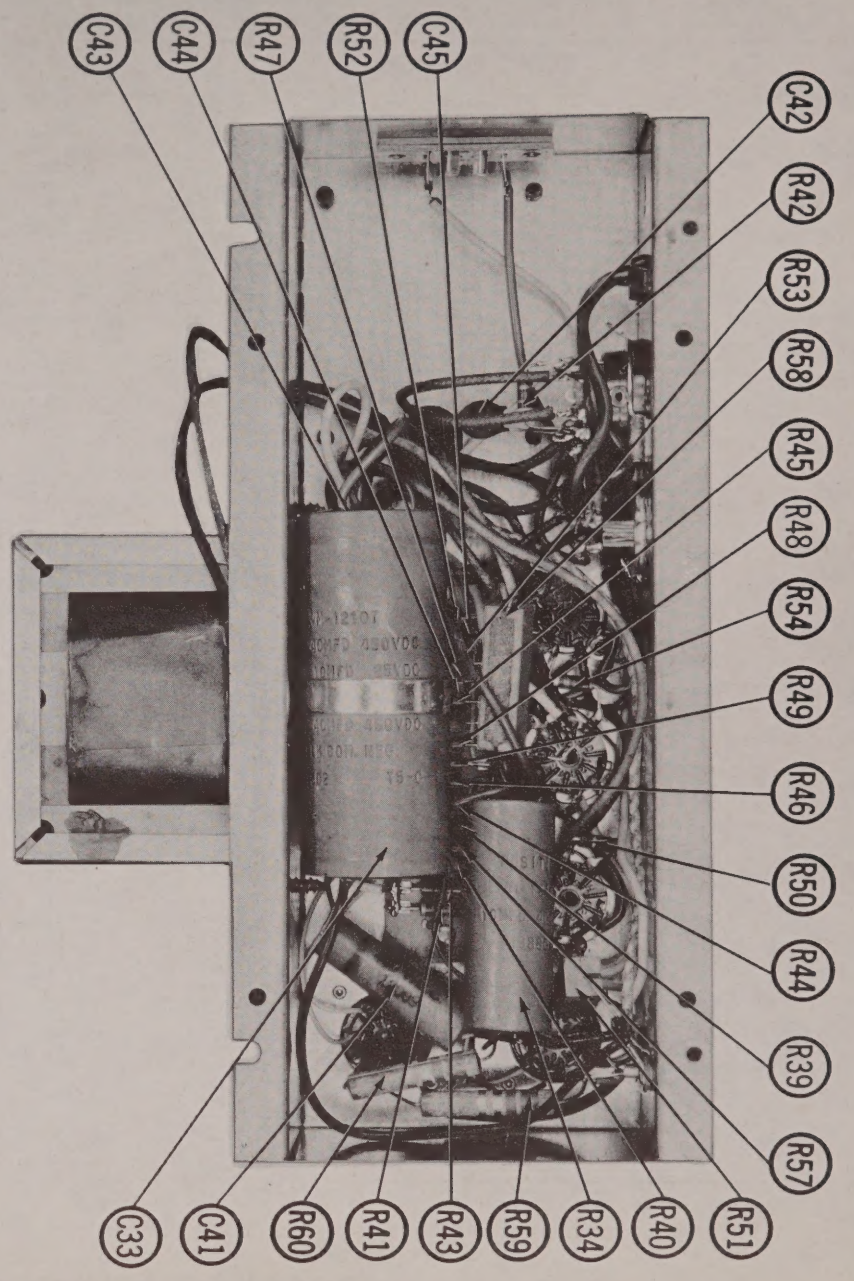
ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA V-M PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C35	5000	600	12083	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C36	5000	600	12083	BPD-005	DD-502	BYA10D5	DC525	5HK-D5	
C37	200	600	12060-10		DD-201	L10T2			10%
C38	1000	500	12066	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C39	10000	600	12062	BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C40	1000	500	12066	BPD-001	DD-102	BYA6D1	DC521	5HK-D1	
C41	.047	400	12009	P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C42	500	600	12064-10		MD-501				10%
C43	.1	400	12008	P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C44	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C45	10000			BPD-01	DD-103	BYA10S1	DC511	5HK-S1	
C46	2.0	100	12069						

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA V-M PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R32A	500K	½	12348					Volume, Tap@150K & 300K Note 1.
B	Switch							
R33A	1meg	½	12347	F1-52			■ UE3833	Brilliance Note 2.
B	1meg	½		R2-52				Bass

■ STA-LOC Equivalent, FB16A, OS812, RU16A, IS1187
Note 1. (Part #12342) used in Model 562.
Note 2. (Part #12341) used in Models 566 &557, (Part #12340) used in Model 562

AMP CHASSIS—BOTTOM VIEW



AMP PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	V-M PART No.	NOTES
R34	47K		11133-10	
R35	47K		11133-10	
R36	100K		11213-10	
R37	10K		10973-10	
R38	220K		11293-10	
R39	470K			
R40	390K			
R41	3300Ω			
R42	4700Ω		10893-10	Note 1
R43	100Ω			
R44	1.2meg			
R45	100K			
R46	68K			
R47	100K			
R48	1000Ω			
R49	330K			
R50	1000Ω		10733-10	
R51	200Ω	2(WW)	12338-10	
R52	1000Ω			
R53	330K			
R54	1000Ω		10733-10	
R55	2200Ω		10813-10	Note 2
R56	6800Ω		10933-10	Note 3
R57	15K			Note 4
R58	500Ω	7(WW)	12337-10	
R59	2.2Ω	1(WW)	12336-10	
R60	2.2Ω	1(WW)	12336-10	

Note 1. Models 562 and 566 use 15K in this application (Part #11013-10)
Note 2. Models 562 and 566 use 10K in this application (Part #10973-10)
Note 3. Models 562 and 566 use 27K in this application (Part #11073-10)
Note 4. Models 562 and 566 use 3900Ω in this application

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA V-M PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	117V @.64A	420VCT @.120A	6.3VCT @ 2.6A	12552						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA V-M PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T3	6200Ω CT Taps @ 315Ω From CT	3-4Ω	12554 ①							① Used in Models 566, 568. Part #12553 used in Models 557, 562

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA V-M PART No.	QUAM PART No.	NOTES
SP1	12"	PM	6-8Ω	15235 ①	12A6PA	① Used in Model 568
SP2	8"	PM	6-8Ω	15108 ④	8A31PA	② Used in Model 566
SP3	3½"	PM	16Ω	8440 ①	3A15T	③ Used in Models 562, 557
SP4	3½"	PM	16Ω	8440①	3A15T	④ Used in Models 562, 568
	8"			15107 ③		⑤ Used in Model 577
	5" x 7"			15112 ⑤		
	4" x 4"			15103 ②		
	12"			15105 ②		

MISCELLANEOUS

ITEM No.	PART NAME	V-M PART No.	NOTES
M8	Lamp	4663	#1847
	Lamp	4653	#1847 Model 562
	Lamp	7791	#1847 Model 566
	Lamp	16586	#GE12 Model 557
M9	Switch	467	Changer, Model 568, 557
M10	Switch	6975	Muting, Model 568, 557
	Switch	6890	Muting Includes Retard Bracket Ass'y. Models 562, 566
M11	Switch	15409	Acoustic Contour, Model 568
	Switch	15118	Acoustic Contour, Models 562, 566
	Switch	15164	Acoustic Contour, Model 557
	Switch	15120	Input Selector, DPDT Slide Type, Models 562, 566, 557
	Plug	644	Phono Input, Control Head Ass'y.
	Plug	8673	Octal
	Plug	5578	3 Prong
	Plug	2156	
	Socket	4228	Phono Input, Amp. Ass'y.
	Socket	2841	Octal
	Socket	4229	External Speaker, Models 568, 562, 566
	Socket	5577	3 Prong.
	Socket	15113	Phono, Stereo Tuner Input, Models 562, 566
	Motor	6950	110 Volt, 60 Cycle, 2 Pole Complete Ass'y.
	Motor	6945	Phono Drive, Model 557

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	15169-B	Tuner Selector, Blond
Knob	15169-C	Tuner Selector, Mahogany
Knob	15173-B	Tuner Dial, Blond
Knob	15173-C	Tuner Dial, Mahogany
Knob	15136-B	Acoustic Contour, Blond
Knob	15136-C	Acoustic Contour, Mahogany
Knob	15135-B	Brilliance, Blond, Models 568, 566-1
Knob	15135-C	Brilliance, Mahogany, Models 568, 566-2, -3, -4
Knob	15133-B	Selector, Blond, Models 568, 566-1
Knob	15133-C	Selector, Mahogany, Models, 568, 566-2-3, -4
Knob	15134-B	Bass, Volume, Blond, Models 568, 566-1
Knob	15134-C	Bass, Volume, Mahogany, Models 568, 566-2, -3, -4.
Knob	6864-A10	Record Support
Knob	15136	Acoustic Contour, Model 562
Knob	15135	Brilliance, Model 562
Knob	15134	Volume, Bass, Model 562
Knob	15133	Selector, Model 562
Knob	6864	Models 562, 566
Knob	6918	Control, Models 562, 566
Knob	15141-B	Acoustic Contour, Model 566-1
Knob	15141-C	Acoustic Contour, Models 566-2, -3, -4
Knob	6071	Model 557
Knob	15141-A	Model 557
Knob	15134-A	2 Used Model 557
Knob	15135-A	Model 557
Knob	15133-A	Model 557
Button	15084-A	Reject, Blond
Button	15084	Reject, Model 562
Cabinet	15154-B	Blond, Model 568
Cabinet	15154-M	Mahogany, Model 568
Cabinet	15073	Model 562
Cabinet	15111	Model 566
Panel	15179	Back
Panel	15350-B	Tuner, Blond
Panel	15350-M	Tuner, Mahogany

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)